STAFF WORKSHOP

BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:	)
	)
2005 BUILDING ENERGY EFFICIENCY STANDARDS	)
	)

CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET

HEARING ROOM A

SACRAMENTO, CALIFORNIA

TUESDAY, NOVEMBER 5, 2002

10:00 A.M.

Reported by:
Peter Petty
Contract No. 150-01-005

COMMISSIONERS, ADVISORS PRESENT

Arthur Rosenfeld, Commissioner

John Wilson, Advisor

STAFF AND CONSULTANTS PRESENT

William Pennington

Bryan Alcorn

Maziar Shirakh

Elaine Hebert

Jon Leber

Bruce Maeda

Charles Eley
Eley and Associates

Bruce Wilcox
Berkeley Solar Group

Ken Nittler
Enercomp, Inc.

Doug Mahone
Nehemiah Stone
John McHugh
Heschong Mahone Group

Dave Springer
Davis Energy Group

Mark Hydeman
Taylor Engineering

ALSO PRESENT

Robert E. Raymer
Mike Hodgson, ConSol Energy Consulting
California Building Industry Association

ALSO PRESENT

A.Y. Ahmed
Occidental Analytical Group
Consultant to Southern California Gas Company

Thomas Trimberger
County of Sacramento
California Building Officials

Michael Gabel,Gabel Associates
Bill Mattinson, Sol-Data Energy Consulting
Gary Farber, Farber Energy Design
California Association of Building Energy
Consultants

Gary Fernstrom
Misti Bruceri
Gary Fagilde
Pacific Gas and Electric Company

Noah Horowitz
Natural Resources Defense Council

Ray Bjerrum
Merzon Industries
AMA Western Region

Dee Anne Ross
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Martyn Dodd
Gabel Dodd

Dave Ware
Owens Corning
representing North American Insulation
Manufacturers Association

Charles Cottrell
North American Insulation Manufacturers
Association

Michael Day
Beutler Heating and Air Conditioning

ALSO PRESENT

Scott Alexander
Mobile Modular

Bob Hansen
Williams Scotsman

John Hogan
City of Seattle

Deborah Gold
Robert Nakamura
CalOSHA

Elizabeth Katz
California Department of Health Services

Tony Pierce
Henry Lau
Southern California Edison Company

I N D E X

P R O C E E D I N G S

10:00 a.m.

MR. ALCORN: Thanks very much for your attention, and welcome to the workshop this morning. My name is Bryan Alcorn, and I'm the Contract Manager for this round of the building standards.

To my right is Bill Pennington. Bill is the Lead Technical person for the project. And to Bill's right is Charles Eley, who is the prime contractor to the Energy Commission for this round of standards development.

I'd like to take this opportunity to welcome the Commissioners who appear invisible right now. But I trust they're listening in from their offices upstairs.

The purpose of the workshop today is to obtain public comment on the first draft of the building standards and alternative calculation methods. A second draft of these documents will be presented at a workshop for sometime in mid January of 2003. So watch the website for the actual date of that workshop.

It's important to note that as was stated in the notice for this workshop that we

won't be talking about any lighting issues today. There will be a workshop on November 18th that will address indoor and outdoor lighting issues.

MR. RAYMER: I have a question.

MR. ALCORN: Yes.

MR. RAYMER: Bob Raymer with CBIA. I just got the notice today about a meeting on the 18th, and so am I to assume when it says 2005 building energy efficiency standards and the lighting, that we're just going to be dealing with lighting on that day?

MR. ALCORN: That's absolutely correct, Bob. Thank you for that. And, in fact, to clarify further what Bob just brought up, there is a document posted to the building standards webpage and to the lighting webpage that has -- it's a document that revises the document that we're looking at today, that you just picked up from the table outside. And it's got revised sections on indoor lighting. And so I would like to warn everyone not to use the document that we're looking at today, the standards document for the November 18th workshop. Go to the website and download that new document which was posted last night for the November 18th workshop.

The format for the workshop today is pretty simple. We're going to be talking about residential issues in the first half of today, and nonresidential revisions in the afternoon, after lunch. So after I finish the opening here we'll hear a brief overview of the revisions to the residential standards and ACM. And then we'll have a one-hour break for lunch -- I'm sorry, before lunch we'll have, there'll be a two-hour block of time where we will hear comments and questions about the revisions to the standards and ACMs for residential only.

Then we'll take a one-hour break for lunch and we'll come back and hear a brief overview of the nonresidential revisions. Followed by a two-hour block of time where we'll hear comments and questions on the nonresidential ACM and standards revisions.

And we'll try to wrap up around 4:30 or so.

To insure that all comments are heard, I think most of you have already filled out these blue cards, and I want to make sure that I have a chance to let everyone say their piece today. So if you can get these cards back, you can give them

to Elaine over here, the Vanna White of the Energy Commission. She can get those back to me and we can sort of get an idea about how we need to lay out these question-and-answer periods.

I want to make comments also about the microphone, or microphones, I should say. Your comments today, it's important, as in previous workshops, to speak into two microphones. There's the taller mike and the shorter mike. The taller mike is to the hearing room APA system; and the short mike goes to the court reporter's recording machine.

So, the court reporter is sitting opposite from me over there; there he is. So if you can be especially careful. Your comments may not go into the public record or be heard if you're not speaking into these microphones. So if we need to delay a little bit in order for you to get to a pair of microphones, then we'll do that. So try to be aware of that today.

Also, at the lunch break, if you'd be careful of the spaghetti in the center of the room here. Already had a person almost trip over that.

So, that's all the comments I have. Oh, I see Commissioner Rosenfeld has joined us.

Welcome, Commissioner Rosenfeld.

Bill, do you have any comments you'd like to make before we get started?

MR. PENNINGTON: Maybe just a brief one. What we've done with these documents is we've tried to capture our standards proposals at this point, draft proposals, as fully as we can. But certainly there will be more refinement to these, in response to your comments.

And there was some things that we didn't get to, so we're trying to highlight some of those things. So, you know, these documents are a work in progress. You have to think of them that way.

Thanks.

MR. ALCORN: Okay, thank you, Bill. Ahmed.

MR. AHMED: I'd like to know in general if there are any written comments filed? And if they are posted in the website -- will be posted in the website?

MR. ALCORN: Yes, that's a good question. There are written comments. Some of the comments will definitely be posted to the project website and be docketed.

There are, incidentally, some errata

that you picked up out on the table, which will be briefly discussed today.

Before we continue I wanted to say one other thing. I wanted to welcome Jon Leber, a special visit from Jon, so it's good to see him here at the workshop.

Okay, Tom.

MR. TRIMBERGER: Tom Trimberger, CALBO. You said this is a work in progress. I'm understanding, though, that it is substantially complete. You know, there are things that we've talked about in the past that are not here. Does that mean that they --

MR. ALCORN: We're going to --

MR. TRIMBERGER: -- haven't made it this far, or they just haven't been added yet?

MR. PENNINGTON: Probably the things that are missing that you would have expected, we actually intend to put into the document. And we didn't get there. But we'll try to make that clear during the day.

MR. TRIMBERGER: So this is incomplete? There's no --

MR. PENNINGTON: From that vantage point, right.

MR. ALCORN: Okay, are there any more questions before we get started? Okay, at this point I'll turn the meeting over to Charles Eley who will do a brief overview of the residential revisions.

MR. ELEY: Thank you, Bryan. I'm going to be assisted by Bruce Wilcox. Bruce and his team did most of the substantive work on building envelope and HVAC measures.

I want to make a few general comments first of all. Tom, as we go -- we're going to go through all of the measures, one by one, in this presentation. And we will indicated whether they're in the standard now or whether we plan to deal with them later. So, I think, on a measure-by-measure basis we will address your question hopefully. If we don't, raise your hand.

One other thing, as most of you know, we've been through six workshops on the standards. And most of these measures have been presented in detail and we've heard testimony on them. And so what we're going to do today is keep things very brief so that we maximize the time for comments.

So, we're going to assume that you participated in all the previous workshops and are

familiar with the issues that concern you. And we're just going to kind of hit the highlights, if you will.

One other thing, just a note in terms of format, if you look at the draft standard --

MR. PENNINGTON: Mike had a question there.

MR. ELEY: Oh, I'm sorry.

MR. HODGSON: When you have a minute, Charles.

MR. ELEY: Okay. I was just going to say, if you look at the draft standard you'll see a series of footnotes throughout the standard. Those are not permanent footnotes. Those will not be adopted as part of the standard.

What those do is they provide a linkage back to the workshops and the research reports that are the basis of the change. So, if you're -- we try to explain the research that was the basis of each change. And those footnotes are kind of a link back to those original research reports.

MR. HODGSON: Charles, Mike Hodgson, CBIA. Could you also, when you go through kind of the high-level issues, tell us whether it's in the

software or whether it's not in the software?

MR. ELEY: Okay.

MR. HODGSON: Can you? Thanks.

MR. ELEY: I may have to kind of look to Ken on some of these.

All right, the first measure is time dependent valuation. This was heard in a workshop on April 2nd. It affects both the res and nonres standards, but we're going to deal with it here.

Throughout the standard everywhere source energy was previously mentioned, it's now TDV energy. And the schedule TDV energy multipliers that have been developed by PG&E and HMG, we actually haven't printed out a copy of those, since they're so long. But they will be -- they're going to be kind of treated like climate zones and referenced by the ACM manual.

Gas cooling. We've added -- this is another one that affects both res and nonres standards. There are minimum efficiency requirements that have been added to section 112 for gas cooling applications. And there's also changes to the modeling rules for gas engine heat pumps and air conditioning, and gas air conditioning units.

In terms of photovoltaics, we've not had a workshop on this. And there's nothing in the standard now. The Commission has determined that they do not want to offer any kind of credits for PVs. We are still -- a prewiring requirement is still under consideration that could go into the standard in some way. But there's nothing in the standard at this point on photovoltaics.

Another proposed measure that's not yet implemented in the standard are demand responsive controls. We're not quite sure what direction this will take, or if it will make its way into the standard. But this is something to enable certain equipment in homes and buildings to be shut off during electricity emergencies.

Bruce.

MR. WILCOX: Okay, the next topic here is residential construction quality for walls. And we actually are treating those here as two separate topics, residential construction quality for attics and walls, because we presented them that way in the workshops. But they're actually implemented as one measure that is available as an optional measure. They were proposed by the CEC and they were heard at the April 23rd workshop.

The basic situation is there's a compliance credit that's available to people for compliance if they get a special inspection by a HERS rater and certify that the insulation systems are installed correctly.

This is implemented in the ACM manual in the section shown there. The overall U factor multiplier is applied within the ACM in a manner that's invisible to the user, so that from the point of view of compliance the system looks the same as it does now. The form 3's are the same.

Now, this is a change from the proposal earlier, which we proposed changing the form 3 calculation to put the wall credit in that calculation. But we've since decided that it's better to put it inside the ACM and treat it invisibly. So that's what's currently proposed now.

The inspection protocol, which we've done a considerable amount of work on with the Committee, that includes insulation industry and building industry and so forth, is documented in appendix -- right behind Mike's head -- the appendix number. I can't see -- RQ2005, okay. Unless we can get Mike to move.

Next. So the attic part of the residential construction quality again is a CEC proposal. And again, it's the same kind of thing. You get an optional credit; you have to certify that you've done the things according to the protocol. And then it's subject to verification by a HERS rater.

For attics there's an overall U factor. It says multiply here, but it's actually an adder that's applied within the ACM, again, invisibly, form 3 calculations remain unchanged. And again the inspection protocols documented in the appendix are --

They're also, if you look at the errata sheet there's a minor but substantial change to two of the coefficients that were documented in 4.2.2. So if you're into the details.

All right, so now the next thing I'm going to talk about is fenestration, a favorite subject of many. The proposal is that the -- it's a change to the way that the ACM calculations are done, and also to the prescriptive requirements that sets the maximum glazing area at 20 percent of the conditioned floor area. And then the standard design is set equal to the proposed

design glazing area, unless it's larger than 20 percent.

A second part of this is that the glazing U factor criteria are in the process of being modified, adjusted to compensate for the changes in the NFRC rating procedures that were recently implemented.

And the intention here is to keep the requirements the same, the technologies the same, and change the factors so that the numbers come out right. At least that's what we're currently talking about. And you'll see those in later drafts.

There's a couple of errata in fenestration, as well. One is that the -- I guess it's not in the errata sheet that was passed out; it's an additional errata. But there's a footnote in the prescriptive tables, the climate zone tables, that gives you a set of alternates that you can use instead of doing duct sealing. It was adopted as part of AB-970. And that alternate should have been crossed out because it has not been recalculated and it's no longer appropriate. Whether or not we'll replace that or not is still open to question. We certainly -- the numbers

that are there now are not the correct ones.

After our previous presentations there were a number of questions about the analysis of the impact of the glazing area change. And a number of people asked that we analyze this separately for multifamily and single family, and look at the impacts separately, and so forth.

And so what I'm presenting here is some information on that subject which we will post to the website so you can get the details. This is a graph that shows the distribution of glazing area for new residential buildings in California. This is based on surveys done by RER for the utility programs. And they surveyed 750 units, new construction units that were involved in this data set.

And what's plotted here is across the bottom the percentage of glazing as a percentage of conditioned floor area. And up the left-hand side is the percentage of houses that have that glazing percentage.

The blue dots are for multifamily buildings. And according to the data set, the maximum glazing area, the most units are at 5 percent. And it gradually goes down. There's a

few that are size 16 or 18 or 20 percent, but the preponderance of multifamily units have small glazing areas.

The red triangles are single family. And there's a distribution there that's more like a normal distribution which peaks at about 17 percent. And there are units all the way from 8 or 9, up to about 30 percent glazing percentage.

MR. MAHONE: Bruce? Where the blue lines hit the zero axis and string out along about 20 percent there, does that mean there are actually instances of multifamily buildings in those high glazing percentages? Or is that just the way the data's displayed?

MR. WILCOX: Those are zero --

MR. MAHONE: Those are all zero, okay.

MR. WILCOX: -- at those percentage. Those are zero, yeah. Any other questions?

MR. GABEL: Mike Gabel, Gabel Associates. Bruce, also, this is for all climate zones, not just the cooling climates or the mild climates? This is all lumped together, is that correct?

MR. WILCOX: That's correct. This is supposedly weighted to represent new construction

statewide.

MR. MATTINSON: It doesn't really present the magnitude of the actual number of units that were multifamily or single family. It's just saying the percentage of the multifamily are on this curve and the single family are on that curve. So we don't have any way of knowing how much energy is --

MR. WILCOX: If you want numbers of units I can put the numbers of units instead of percentage. It's about 30,000 multifamily units and about 100,000 single family units.

COMMISSIONER ROSENFELD: But he's right, actually publishing, it would tell us a lot more if it were weighted by units and not by percent.

MR. WILCOX: Okay. I mean I will put that on the website, too.

MR. MATTINSON: Thank you.

MR. HODGSON: This data will be available on the website, Bruce?

MR. WILCOX: Yeah. I wasn't planning to present the whole data set, although we could do that if people want it. But it's either way. Let me know if you're interested in this data. Actually, the author of this data is sitting in

the back of the room. Why don't you hold your hand up, Rachel. Who was the project manager, Rachel was project manager for this at RER. And she can tell you the complete details and provide you with way more detail than I can on this.

MR. HODGSON: I just have a question, Bruce. I don't know if I understood you correctly, but you said there were a large percentage of multifamily units with 5 percent glazing?

MR. WILCOX: According to the data.

MR. HODGSON: Okay. I'd like to see the data.

MR. WILCOX: Okay. Any other questions on this? Next slide.

All right, so this is a plot that's similar to the one we presented at the last workshop where we tried to show what was the impact of changing to this new set of rules where we shift to a 20 percent maximum glazing and make the -- for buildings with less than 20 percent we make the glazing equal in the proposed and the standard design.

And there's two sets of bars on this bar chart. The one on the left is the old fashioned

source energy. The one on the right is the new TDV energy approach. And I'm going to focus on the TDV energy approach.

The first bar on the left of that group, which is this bar here, shows how much TDV energy is consumed on the average in the statewide based on weighted by number of starts, and using the prototype house. That's the basis. And it's about 45 or so. This is for multifamily.

If you shift over to the new proposed procedure and everything stays the same, people don't change the glazing area, the data would indicate that that consumption for multifamily goes down to about 37, 38, kBtus per square foot.

We've also, since we're taking away a criteria and maybe an incentive for small glazing areas, it's possible that builders will respond by putting in more glass. And so we've allowed for that by showing what would happen if the average house had 1 percent more glazing area, 1 percent of the floor area more; 2 percent of the floor area more; 3 percent; and so forth, all the way up to 4 percent increase. Which is 20 or 25 percent increase in the glass area.

And as you can see, they can do all of

that and not come close to using as much energy as they could under the current standard.

I think it's unlikely that builders will increase the glazing area this much, because they don't have, in most cases they currently don't have any limits on the glazing area because the standard is loose enough so that you can comply easily without limiting the glazing. And they build the buildings with the glazing that they have.

Next slide.

MR. HODGSON: Bruce, before you move on.

MR. WILCOX: Um-hum.

MR. HODGSON: If I may ask a quick question on the first two vertical columns.

MR. WILCOX: Yes.

MR. HODGSON: I think it says current and proposed, I can't see that far.

MR. WILCOX: Yes.

MR. HODGSON: So, if we interpret this first column is how TDV would be interpreted today if you were implementing it with today's standards?

MR. WILCOX: Correct.

MR. HODGSON: And then with proposed,

that would be under the 2005 standards?

MR. WILCOX: The proposed 2005 standards.

MR. HODGSON: Okay, so that would be the stringency due to TDV?

MR. WILCOX: No, that's the stringency due to the change in glazing rules.

MR. HODGSON: In just the glazing rules?

MR. WILCOX: Right.

MR. HODGSON: Okay.

MR. WILCOX: And the reason that happens is because under our current proposal people don't get a credit for smaller glass areas. So, all these units that have small glazing areas would have to install more measures than they do under the current rules.

MR. HODGSON: Do you have a similar impact for just TDV? Similar comparison? Current versus --

MR. WILCOX: Well, the set of bars on the left is that same calculation for not TDV energy using the new calculation procedures.

MR. HODGSON: Um-hum.

MR. WILCOX: So, I think it's essentially, if not identical, it's very similar.

So I think the conclusion is that this is not a TDV issue.

MR. HODGSON: Right, but I'm trying to tease out what's the impact of TDV on multifamily. And this doesn't give us that information?

MR. WILCOX: No. I'm not sure what exactly how to structure that question, but we'd be happy to talk to you about it.

MR. HODGSON: Okay.

MR. WILCOX: Okay, here's the same analysis for single family. And this is -- there's a little difference here under TDV and source. The focus on the right-hand bars you'll see that if we change from current implementation to our new proposal, the energy use goes up from 42.7 to 43, which is a less than 1 percent increase. And then any increase in glazing area from there on up will cause an increase in the energy use.

But, even just on single family, if the glazing area doesn't go up, the energy use under the new proposal is pretty nearly the same as it is under the current standards.

Next slide. And then if you look at the overall impact, you combine multifamily and single

family together, according to their number of units and using the RER database, you can see that this is similar to what we presented before. That even if people increase the glazing area up to between 1 and 2 percent, the total energy comes out similar to what it is now.

MR. MATTINSON: Excuse me, by overall impact, does that mean you're lumping single and multifamily together?

MR. WILCOX: Right. So, I gave you single family, I gave you multifamily, and I gave you the two combined together.

MR. ELEY: Weighted. They're weighted.

MR. WILCOX: Weighted according to the number of units and the number of sizes and glazing areas and so forth.

So I wanted to say a couple other things about the glazing proposal here before we leave it. The team here considered several approaches to how to deal with this problem of glazing.

And we selected the one we're proposing because number one, it simplifies the standard. It makes the glazing part of the standard simpler because there's not this complication of one different proposed and standard budget house

variant. And it makes that not a compliance problem in the field. You don't have to worry about glazing area.

Number two, it solves the problems of multifamily, the big multifamily loophole where we, in effect, don't have a standard for multifamily buildings in the current standard.

Number three, it solves a comparable problem on the other end for single family houses with large glazing areas, which has been traditionally a big complaint of the buildings and so forth in the standards.

And number four, it encourages everyone to install cost effective, proven cost effective measures in all buildings. And I think that's a direction that is a positive direction.

And finally, it results in, we think, a modest energy savings compared to the current standard. So I think it's an overall win and we think it's the best thing to do.

I'm sure no one will have any comments on that.

(Laughter.)

MR. WILCOX: Okay, now improvements to existing homes for windows. PG&E proposed this.

It's implemented in the drafts. The prescriptive fenestration performance requirements apply to replacement windows in existing buildings. This is a departure from previous standards. This is in section 152(a) and 152(b).

There were a number of miscellaneous proposals for items from the November workshop last year, about a year ago, that we put into what we called the group 4 measures. And some of those are issues for the design manual and we put those off. Some of those are issues for the standards, including these here.

There was a proposal to get rid of the exceptions less than 500 square feet additions on fenestration that John Hogan made. And we implemented that one. There was a proposal to put in radiant barrier suppliers that will -- it's a manual issue for the residential conservation manual.

And there was a proposal that we make the U factor calculation procedures in the standard consistent with ASHRAE 90.1. We're still looking at that. The Commission has traditionally had their own calculation procedures, and we may think about changing that.

Next. Another area that we're proposing a new requirement in the standards is maximum allowable cooling capacity requirement. This was a CEC proposal. And the essence here is that ACMs are required to calculate a maximum allowable cooling equipment size, basically compressor size, for new residential buildings.

The maximum compressor size calculation is for the worst orientation for production homes. And allows for available system sizes. This sizing procedure is documented in the ACM appendix RM, and in 151(h) of the standard. And the proposal allows flexibility if you put in a higher onpeak efficiency unit than normal.

There are a number of measures on residential ducts. The CEC was the proponent on this. We proposed increasing the R value of duct systems to R8 instead of R4 in all but three of the climate zones, all but climate zones 6, 7 and 8, as a prescriptive requirement.

The second thing is we've changed the modeling procedure for fans and how we deal with fan energy in the performance standard. And added a credit for high efficiency fan and duct systems that's available if you certify the performance

and have it inspected by a HERS rater.

We've changed the mandatory measures to prohibit porous lined flex duct because of its problems with leakage in the long term. And we've changed the modeling procedure for fans as documented in appendix RF of the ACM manual and in ACM 3.2.13.

This is improvements for existing homes. This was a PG&E proposal. This is one of those areas where things are not implemented in the current draft of the standards, but it's still under -- work is still going on on this measure and it may appear in later drafts.

MR. MATTINSON: Bruce, there's one thing that I think you did that I either missed or didn't see up there. It was an improvement on ducts for new construction. And that is that the current standards allow a credit for so-called proper duct design. That's been revised and rather than referencing one specific procedure, it seems to be focusing now on proof that there's enough air flow. And then it's also linked to a field inspection that validates that. Whereas, my understanding of the current, you can get the design credit without the validation if you had a

TXV or some odd combination of things.

Maybe I'm wrong on that point; Bill's shaking his head. But I think this is an improvement in that it comes down to an actual test-able value that's fixed, rather than some reference procedures.

MR. WILCOX: Right, there isn't -- we have, I think, improved that area considerably. Currently, the current proposal says if you design your duct system and you put the design on the plans so that it's checkable, that you can then get this credit for a reduced fan wattage if you show you have enough air flow.

And you can also get the credit that's currently available in the duct efficiency calculations for reduced duct area.

But, again, those all flow from having a design that you show that it's going to work, and that someone can check in the field.

MR. MATTINSON: That's good.

MR. WILCOX: Okay, next slide. All right, in computer modeling we made a number of changes to improve things that are related to measures and related to TDV and trying to make the computer modeling work better on an hourly basis.

It's implemented in various sections of the residential ACM manual. It includes changes in thermostat set points, slab-edge loss model, natural ventilation assumptions, solar gain factor and so forth. All of this is essentially invisible to the user, but will improve the -- we think it will improve the calculations.

Mike.

MR. GABEL: Bruce, can you characterize briefly the changes to the slab edge loss model --

MR. WILCOX: Yeah, the current model, the slab UA is connected from the house temperature to the outdoor temperature instantaneously. So, whatever the delta T is right now is what drives the heat loss.

And there's, in fact, known to be large temperature lags in the ground due to the mass of the ground, so that you don't actually get the instantaneous temperature, you get a longer term average temperature that's lag seasonally, maybe even -- and one of the things is you don't get cooling loads coming from your slab in the summertime, because it's hot outside generally.

And so we've now connected the slab edge to a monthly mean temperature, ground temperature.

And so that improves that behavior a lot.

MR. GABEL: Okay. Have you guys also worked with the below-grade walls problem?

MR. WILCOX: No.

MR. GABEL: No. Wed like to see that.

MR. WILCOX: Yeah.

MR. MATTINSON: Just wondering why the heating thermostat setpoint was raised from 60 to 65.

MR. WILCOX: Well, there was a lot of thinking that 60 is really an unrealistic number for real houses. I think nobody has any data that shows that that's even close to an average behavior. And so we were trying to make the standards represent reality better, I think is the answer.

MR. ELEY: This is for setback?

MR. WILCOX: Yeah, the setback temperature. The current standards say that it's 68 in daytime and sets back to 60 at night, which results in basically no heating at night in many climates. And that's basically unrealistic because people don't really do that.

MR. HODGSON: Maybe this is a question for Bill, I'm not sure. It sounds like the model

has adopted TDV. And has that decision been made that the standards of 2005 are going to be based on TDV-based software?

MR. PENNINGTON: The Commission will decide that when it adopts the standards.

MR. HODGSON: Okay, so do we have to analyze it both with TDV and without TDV. Or do we wait for the Commission to adopt the standards and then analyze it? How do we know the difference?

MR. PENNINGTON: Well, this is our proposal at this point.

MR. HODGSON: And the proposal has TDV in it, correct?

MR. PENNINGTON: Right.

MR. HODGSON: Okay. We've been working diligently for the last, you know, three or four years developing a HERS rating system. Are you going to develop now a separate model for non-TDV HERS ratings versus -- which is the way we do HERS ratings for the state and nationally? Is that incorporated into the software? Or is that a process that you'll have ready at implementation time?

MR. PENNINGTON: No, that would be a

separate proceeding.

MR. HODGSON: Okay, how do we do HERS ratings then until that proceeding is done after 2005, since we haven't had a HERS rating proceeding for what, four years?

MR. PENNINGTON: The way they're done now. Until the --

MR. HODGSON: Okay, so --

MR. PENNINGTON: Until the proceeding changes the rules, the rules wouldn't change.

MR. HODGSON: So the Energy Commission would support software for both non-TDV, which would be for HERS ratings, and for TDV, which would be for compliance work?

MR. PENNINGTON: The Commission hasn't made a decision about that.

MR. HODGSON: Has the Commission thought about supporting the existing HERS system until you can adopt software that would go both ways, which I presume is what you would need to do?

MR. PENNINGTON: I don't know how to answer that question.

MR. HODGSON: Okay.

MR. PENNINGTON: This whole area of questioning hasn't come up.

MR. HODGSON: Okay. I think, I mean we're encouraging people to do compliance work that then encourages people to then go out and do inspections on site, which we think is very progressive, and we think it's very smart.

However, there's a national industry out there that we're also growing and we're a subset of, that is the rating industry. And the rating industry has a specific set of software criteria that we're trying to conform to. And we just want to make sure, as the building industry complies to that, that the building industry also has access to continue that encouragement to go beyond code or meet code, but can do it in the fashion that they're accustomed to now, which is non-TDV, as well as TDV.

And it's kind of difficult for us to make opinions if we don't know whether we're going to adopt TDV.

MR. FERNSTROM: Bill, Gary Fernstrom, PG&E. Isn't it true that HERS has a slightly different goal than the building standard Title 24? I thought HERS had to do with recommending what retrofits might be appropriate in existing buildings and served as something of an indicator

to the owner/tenant/entity that pays the electricity and gas bills as to how they might expect a particular building to fare, relative to other buildings. Is that correct?

MR. PENNINGTON: Partially correct. There's ratings for new homes, as well. And there's a strong interest in ratings for new homes. And that's what Mike's interested in.

MR. WILCOX: Yeah, the HERS industry is revising their calculation procedures right now. I'm on the committee that's reviewing that.

And one of the -- I mean they're definitely moving in a direction that tries to get more realistic calculations. They're not very interested in TDV at this point, although if you were to come in and recommend it that might be helpful, Mike.

The other thing about the HERS rules is that the calculation rules say that if the state prescribes a different set of rules, that's what you use, period. So.

MR. FERNSTROM: The reason I asked the question is because it would seem to me that we might want to build buildings to a different criteria than necessarily the HERS rating supplies

a measure of performance.

I don't see the home energy rating necessarily needing to align perfectly with the building standard. Because home energy use is probably predominately affected by the way in which people live in their homes rather than the structure or appliances within the home, themselves.

MR. PENNINGTON: Well, we could have quite an interesting dialogue about that. I'm not sure that's the topic for today's meeting.

MR. FERNSTROM: Well, the reason I raise the point is because I sort of implied from Mike's comments that there was some interest in having the CEC make these two things aligned; that is, to say if we're using TDV for the energy standard, well, will there be TDV for HERS.

And I just wanted to raise the question about whether that would necessarily be needed to have these two things aligned. And I think I've sufficiently raised that question.

MR. MAHONE: Can I ask a follow-up question to Bruce? Could you expand on that statement about how the HERS rules say that if the state adopts a different set of procedures then

HERS uses those? If I heard you right.

MR. WILCOX: That's the statement that's been made on this committee that's working on the rules. That's the out if I raise the problem that we're trying to do something in California that we think is better, then the answer is always, well, the rules allow for the State of California to specify some different set of rules for the HERS raters in the State of California to use, in addition to the state law in California, that's good to have.

MR. HODGSON: And my point is I don't have an opinion because I don't understand TDV well enough to say that it's good or bad. I mean the opinion I have is have we thought about not putting the HERS industry out of business in 2005. And we need to make sure that the software that the HERS industry that we're trying to grow, which is probably 95 percent new construction right now, Gary, not residential existing construction, we want that to continue. That is really the commissioning group that we're going to have implement the 2005 standards.

So, let's be alert to that issue. Let's at least think about it prior to 2005 so there's

not a hiccough or a gap of a year or two where we don't have a tool to implement these standards.

MR. NITTLER: Can I make a couple comments regarding the software? I think Mike's specific issue of the way EnergyStar is written right now, and the way it's presumably the biggest use of a HERS verification is 15 percent above Title 24. And I would presume that that would apply whether the basis is TDV or source energy.

So we probably have a consistent methodology. So hopefully some of what you're bringing up wouldn't be much of a concern.

I want to just -- there have been a bunch of questions that revolve around software, so I just want to give everybody an update of where the software stands.

Courtesy of Southern California Edison and Pacific Gas and Electric, a number of people involved in the process had access to a special version of MICROPAS, it's called MICROPAS version 6.5. This was back in July.

It's a very robust version that has virtually everything that's been discussed up here except the stuff that has come after July 28th when I released it.

They very carefully documented this version. It says explicitly what's there, what's not there. Some of the questions about TDV, the way it's handled in the current version is that side-by-side it shows -- well, it calculates the energy use based on all of our assumptions. And then it shows side-by-side the source energy budgets and the TDV budgets. So whatever analysis you want to do you can go either way, the way it's set up right now.

Now, I would expect that if we were talking compliance of 2005 probably all it would normally show is the TDV values, if it makes its way through the process. But right now, anyway, you can see both.

The things, TDV, the DAR values, the modeling rules Bruce just went over, all that sort of stuff was in there. There are two notable things that are not in the version that was released in July. One is the maximum allowable cooling capacity, but that doesn't affect the energy budgets, which is historically where most of the discussion goes. We're talking about stringency.

The other thing that's not in there is

the hourly water heating calculation. There is a TDV water heating calculation that has an hourly component based on some work that was done by Charles earlier in the process.

Obviously recently there was a change made to how we're going to treat the attic component of the insulation quality issue. So that's not in the July version, although you could actually get there by carefully constructing your own U factors.

Kind of short-term, I have a version 2 of this release near completion. It would have the things that's being proposed for insulation quality in it. It also adds, there are a number of new credits that Bruce talked about, or may be getting ready to talk about, things regarding fan power and fan flow, and capacities of cooling equipment that will be in that release, as well.

MR. HODGSON: When?

MR. NITTLER: Shortly, like a week. I mean it's not -- really, all that said, the two big things are the water heating and the maximum allowable cooling capacity.

MR. RAYMER: It'll be available in a week?

MR. NITTLER: Yeah.

MR. ALCORN: Ahmed.

MR. AHMED: Basically your version that's going to come out in a week will have all the measures that are in the standards today? Because even the standards, themselves, they're going to change again because there are certain aspects have not been included yet, as Charles was mentioning.

MR. NITTLER: You know, my actual opinion is the sort of things that they're talking about not being included in the standard, I'm not aware of any of them have any impact on the software. I really believe the version that was released last July has the vast majority of all changes I've seen that apply to software, with the couple exceptions I just noted.

MR. AHMED: So the next version should bring it up to current?

MR. NITTLER: Except for the maximum allowable coolant capacity and the hourly water heating.

MR. AHMED: And this version is a compliance type of version? In other words it compares budget with the standard?

MR. NITTLER: Right, budgets are automated.

MR. AHMED: Then how is the budget calculated, because under source energy the comparison is a little different than what it will be under TDV.

Because under source energy you would compare, for example, a natural gas furnace with a natural gas furnace, default natural gas furnace. Under TDV how is it going to be done?

MR. NITTLER: The same.

MR. AHMED: You are proposing that it will be the same?

MR. NITTLER: That's my understanding of what the proposal is. I mean there is one switch. If you have LPG, you say yes that you have LPG, and then the basis would be LPG. But I'm not aware of any other changes to the standard budget that say suddenly compares the heat pump, an electric heat pump to a gas furnace. I'm assuming that that -- or I believe that stuff remains the same under the proposed standard.

MR. WILCOX: I think we -- let's try and finish the presentation. We're going to --

MR. ELEY: We're almost done.

MR. WILCOX: -- general questions. We're almost done here.

Okay. One of the other changes having to do with both TDV and hourly modeling is there's a duct, an attic hourly model that affects the duct efficiency for residences with ducts in the attic. That's documented in appendix RF. And applies only to attics; other duct systems the calculation remains the same as it is now. And the seasonal efficiency calculation, except for some editorial revisions, remains the same as it is now.

Night ventilation was one of the proposals that PG&E made, and this option is still under development. It's not in the current draft. It may be in at some later point.

MR. ELEY: This is a compliance option.

MR. WILCOX: It's a compliance option, actually. Okay, one of the things that people, I think, are concerned about, and there have been some questions about earlier today, has to do with how all these things stack up against each other and how big are the credits for construction quality and so forth.

So, we've done a little simple

comparison of measures that implements all the proposed rule changes and all the algorithms and so forth. And looks at the value of a range of compliance options, three or four different kinds of windows; high efficiency air conditioner; high construction quality; high efficiency air handler; house wrap; radiant barrier; TXV; duct insulation; duct sealing and so forth. And looks at how much are those measures worth for the prototype house in all 16 different climate zones.

The units here is percentage of TDV compliance budget. And gives a pretty good handle on how things trade off against each other.

At one point we thought we were going to have this on paper to hand out today. But it'll get posted on the website so you guys can look at it.

But we think -- we're pretty comfortable that things make sense and are fairly well balanced. And if there are any questions about that we can look at this in more detail later.

MR. MAHONE: Bruce, I've got a -- my question is it says negative is savings and --

MR. WILCOX: Oh, yes, well, --

MR. MAHONE: All the duct sealing is

positive numbers, so I'm confused.

MR. WILCOX: Well, the way this is all constructed is as single parameter changes to the proposed package.

MR. ELEY: I think duct sealing means you're removing ducts --

MR. WILCOX: Yeah, so the only -- duct sealing is required in all climate zones, so the change is you take it out.

MR. MAHONE: Oh, oh.

MR. ELEY: So that's why it's --

MR. MAHONE: Okay, that makes a little more sense.

MR. WILCOX: But in some of the measures, TXVs, for example, are in some zones and not in others, so then you try and make it straightforward. It's negative/positive.

MR. ELEY: This graph takes some getting use to.

MR. ALCORN: It's a negative point system, right.

MR. ELEY: That's right.

MR. WILCOX: Well, I could do it all absolute -- then you'd have to try and figure out, well, are we taking it out or putting it in.

MR. ELEY: We're going to run through the water heating changes. We have implemented an hourly water heating methodology, which is not in the MICROPAS yet. This is documented in appendix RN.

This procedure applies to low rise residential buildings, but it also applies to high rise residential buildings. The current residential water heating method also applies to high rise residential buildings. So this is consistent.

This was -- the hourly method was presented at the May 30th workshop. PG&E is the proponent of this.

We've also modified the water heating distribution loss methods. These were presented by -- this work was done by Davis Energy Group. It was presented on April 23rd.

These credits for distribution losses and the basecase distribution losses are also documented in ACM RN, appendix RN.

One significant difference is that the basecase distribution losses are a function of both the floor area and number of stories. This is a change from the past where the distribution

loss was considered to be just one. So this acknowledges that large rambling homes are going to have larger losses than smaller compact homes.

With regard to multifamily there have been some significant changes. These were presented May 30th. PG&E is the proponent of this; Nehemiah Stone is the researcher.

Basically the rules for defining the standard water heating system in multifamily is that if your proposed design has individual water heaters, then so does your standard design. If your proposed design has a central water heater, then so is your standard design.

So this closes one of the big loopholes that we've had in the standard where previously the standard design always assumed individual water heaters. So if you went to a central water heater there was kind of a big credit right from the get-go.

The last bullet is also quite significant. We have much improved procedures for calculating losses from recirculation systems. In the existing standard recirculation systems are treated as a distribution system multiplier. But the research indicates that that's not the way to

do it. That the losses from recirculation systems are actually independent of any draw from the dwelling units. And it's an adder or a constant that's put on top of the loads from the dwelling units.

So there are modeling procedures set into the method that take account of the lineal feet of recirculation piping in unconditioned space, in plenum spaces and below grade. So those three things would be inputs to the process.

And then there's a standard level of insulation which is the mandatory requirement. And then there's enhanced level of insulation for the recirculation system where you can get some credit.

MR. HODGSON: Charles, is that strictly multifamily or multifamily and single family for the recirc issues?

MR. ELEY: It's both.

MR. STONE: Nehemiah Stone, Heschong Mahone Group. This is central water heating system serving multiple units. So, --

MR. ELEY: It's just, what we're talking about is the loop before the water actually enters the dwelling unit. Once the water enters the

dwelling unit then we deal with it with the Davis' multiplier. So it's multifamily.

MR. HODGSON: Okay. So there are no single family recirculating --

MR. ELEY: No.

MR. HODGSON: -- system change?

MR. ELEY: Well, there is a credit or a penalty for recirculating systems in multifamily. But that's dealt with in the distribution multipliers.

What we're talking about here is the loop that brings the water to the dwelling unit.

MR. MATTINSON: But I do think that the single family recirc model has been tightened down from what Davis proposed earlier this spring. As you know, Mike, right now sometimes you get a credit when you have recirc, or very little penalty. And that's been corrected appropriately.

MR. ELEY: So if you go back to the April 23rd handouts, that has in it the recirc multipliers for single family.

So, that's it, Bryan.

MR. ALCORN: Okay, thank you, Charles and Bruce, Ken. Okay, so we have an hour and 45 minutes -- or I should say the next hour and 45

minutes are going to be for questions and comments on the proposed revisions to the res standards and ACM.

I've received a couple dozen blue cards that are for residential; and about half of those are for one subject, which is the glazing area. So, what I'd like to ask is that -- I'm going to call the names on the cards, and if you're seated, make your comments from your seat, obviously. If you're in the audience, please come to the lectern and make your comments.

And I'm going to try to, if we can, try to keep this, you know, your comments, if someone's already made your comment perhaps you could say that you agree with the previous speaker, so that we can fit everybody in. I would appreciate that much.

Okay, so the first comments are from Bill Mattinson.

MR. MATTINSON: Thank you. First the good stuff. I do want to praise staff and their consultants for a lot of these issues. I think the insulation, quality insulation installation has been clarified a lot since the spring workshop. It's a lot easier to understand how one

might quantify and approve a good installation. There's still a lot of gray areas there that I'm sure will resolve themselves during the time that it's in credit.

I think -- we're not talking about it today, but the residential lighting changes are very good. The water heating corrections are excellent. The maximum A/C sizing looks pretty reasonable and probably necessary. The R-8 ducts look good. So there's a lot of improvements both in slight increase in stringency that's appropriate, and some clarification of some poorly implemented previous measures.

The one area that I am concerned about and Mike Gabel has more to say that is connected to what CABEC wants to say, is on the glazing area.

I still have some problems with that. I think it's somewhat discriminatory in that we're allowing 20 percent glazing, which is usually desirable for higher end homes at the expense of the opportunity for more modest homes to be energy conserving by selecting less glass area.

I think that this is supposed to be offset, according to the graphs that Bruce showed,

by the savings primarily in multifamily homes, which use very small glazing area. My suggestion there is to follow what one of the contractors proposed early in the process, which is a separate standard for multifamily, just as we're starting to do with the water heating side of multifamily, recognizing that they're two different animals and should be treated differently.

I think there should be a niche for modest single family homes where designers and builders, particularly in self help and low income programs, can choose to use less glass area as a conservation measure and an economy measure, a first-cost economy measure; perhaps trading it off against the cost of a HERS inspection or something like that. We're doing away with that, and I think that's a problem.

In many ways it just doesn't make common sense. I've made this comment before. After working with builders and designers and homeowners for 20 years on the standards, they've come to understand that more glass area means more energy use. Now I'm going to have to show them the converse is not true. Less glass area doesn't mean you get a lower energy budget or a better

savings in the standards.

And then finally, in the consultant paper that we saw this spring on fenestration percentage area, one of the comments in the text was that one goal was to reduce the importance of glazing area in the standards. And that solution, by raising the glass area from 16 to 20 percent, just doesn't make sense.

I mean it's like trying to solve the national obesity problem by raising the pound from 16 to 20 ounces. I mean it looks like it, --

(Laughter.)

MR. MATTINSON: -- but it doesn't really fix the issue. And then the proposed savings that we're shown on the chart that we haven't seen, other than on the screen, that shows there are actual net savings only works if people don't use more glass area. If they're not going to use more glass area why are we raising it to 20 percent in the first place?

So that's my personal take. And the CABEC final position is yet to be determined based on where the standards, the next version goes. But Mike Gabel has some related comments that are also coming from the same place, I think.

MR. ALCORN: Thank you, Bill. Mike.

MR. GABEL: Thanks, Bryan. I'll try not to repeat Bill. I do want to emphasize that I think the staff has done a great job and the consultants in almost all the proposed changes. It's really excellent work, and I think there's a lot of support out there for almost all the proposed changes in the standards, so I want to thank you for that work.

I think the concerns I share with Bill is the fact that there are a whole bunch of homes that are going to be built after 2005 which the new rules will allow them to put in more glass with the same energy measures that just meet the standards now. Those homes will be allowed to have more glass in them with the exact same energy measures.

So what we're doing is we're increasing the energy budget for that group of homes, and the peak electric use. And I did a back-of-the-envelope calculation which is, even if I'm off by a factor of two, in the letter I wrote to Commissioner Rosenfeld, it's still a lot of peak demand increase as a result of this proposed change over the next 25 years.

If left unchanged, this proposal -- I think the CABEC position is, I think Bill would agree, that we just don't want -- we don't want to have the building industry meet higher standards for these class of buildings, we just want them to be energy neutral essentially, as compared to where the current standards are.

The main arguments against this change are that we're giving energy away that's currently being realized successfully under the current standards. For the last 18 months these buildings are meeting the current standards. And we're going to -- sort of giving away contradicts the mandate of AB-970. It runs counter to the notion of instituting TDV source energy to the performance standards, I would say.

The change undermines the legitimate efforts of the Commission, the staff and consultant in developing other genuinely worthwhile improvements, which you've all done, as I've mentioned.

It sends the wrong message to building designers and homeowners that there's no real relevance or value to regional architecture, which traditionally controls the glazing area in

especially hot climates. It increases energy use in peak energy of custom single family homes on the backs of multifamily and affordable housing, as Bill has mentioned.

And it sets a bad precedent in moving away from energy efficiency for a rather large class of new construction, something that, to my knowledge, has never occurred before with this magnitude in the standards.

So I'm urging the Commission and staff to reevaluate this aspect of the proposal and consider some alternatives, which might include some other way of making this class of buildings energy neutral and still raising the glazing to 20 percent. I think there's still a possibility there.

One potential alternative to the staff standard is that -- draft standard is that we keep the glazing at 16 percent. That we let the standard design track the proposed design in glazing area down, the way the staff has shown it to be energy efficient. And that we put a floor or a bottom limit to the glazing percentage of 12 or 14 percent to accommodate multifamily and low income housing.

And that's all I have to say. Thanks very much.

MR. ALCORN: Okay, thank you, Mike. Next, Noah Horowitz.

MR. HOROWITZ: I'm Noah Horowitz for the Natural Resources Defense Council, NRDC. My comments are going to be on fenestration, as well, and I echo a lot of what was just said.

We appreciate your attempt to revisit this and recognize it's complex, once you look at single and multifamily homes.

Based on the analysis that was shown, and we need more time to look at it, but at first brush it seems like we might be backsliding on single family homes. And I would encourage the Commission, staff and consultant to de-link single family and multifamily.

It seems like you clearly have a winner on the multifamily; let's do the right thing on single family.

Taking a look at the data, and you don't need to answer these today, but it seems like I haven't seen sufficient justification why 20 percent. If the bulk of production homes are using less than 20 percent glazing, why are we

going up to that number and giving away some of the savings?

The approach that's been shown also seems to focus on simply how much window, what's the percentage of windows that's being installed. Not the quality of the windows. So I'd like you to take another look or get back to us, especially for those homes that are using more than 20 percent glazing. It's probably very cost effective for them to have more stringent SHGC or U values. I'd like your thoughts on that.

So those are the comments on fenestration. Big picture, we know you've got a lot of work to do and everything is interrelated, but it would be great to see an overall analysis of what the energy impact is of the proposed standards; what the incremental cost is and the energy savings.

It could be that the fenestration thing we're all focusing might be relatively small compared to some of the other measures being proposed.

Thanks.

MR. ALCORN: Thank you, Noah. Next, Misti.

MR. ELEY: One of our tasks, as soon as the standard is sort of settled a little bit, is to do a detailed impact analysis of both the res and the nonres standards, so that's one of the things that's still in front of us.

MR. ALCORN: Thanks, Charles. Misti.

MS. BRUCERI: Misti Bruceri with PG&E. And I, too, echo many of the statements that we've heard already from Noah, Mike and Bill. And also appreciate the effort to close the loophole in multifamily construction right now that is really currently allowing sub-optimal construction for these buildings. I think that's an excellent effort being made there.

But we have some concerns about raising the glazing allowance in single family homes. The analysis shown this morning showed that if it was raised to 18 percent and the glass area increased to 18 percent we would have equivalent energy to the current standards.

And so while we believe the glass area percentage should be maintained at 16 percent, we find a huge concern with allowing 20 percent glazing because that would actually result in an increase in energy use overall. And that creates

a huge concern. So we'd like to encourage the Commission to revisit this. And also to maintain the current 16 percent maximum.

MR. ALCORN: Thank you, Misti. Next, Ray Bjerrum, Merzon Industries.

MR. BJERRUM: I'm Ray Bjerrum with Merzon Industries, and also President of Western Region AIMA. I hate to follow all these people that hate fenestration.

(Laughter.)

MR. BJERRUM: I would like to speak for fenestration today, and thank the Commission for considering some proposals. We in the fenestration industry have said for a long time that we don't want our products traded away for other compliance measures.

People do like to live in houses with glazing. And I think, if I remember correctly, the reason that we went to the 20 percent was to make all climate zones equal. And that was what the original proposal was for. And I support that.

We in the fenestration industry would also like to question a couple issues here. In the package D there is still a proposal if it's 20

percent is that if you use a different U value you could then not use tight ducts. And I'd like to ask the Commission -- and what the proposal is, if you have the alternative calculation method, because you're not to trade away what the basic package is. So what would we do with that if we're still going to say that unless the tight ducts aren't in the package, and you have to go to a --

MR. MATTINSON: They deleted that, Ray.

MR. BJERRUM: Huh?

MR. MATTINSON: That was the alternative for non-HERS rated package. I think that's gone, isn't it?

MR. PENNINGTON: We have not evaluated what would be equivalent to the new package and whether or not, you know, it's feasible to have that kind of an alternative, so --

MR. BJERRUM: Well, the fenestration industry would like to see by 2005 that tight ducts would be so common that you would just make them a requirement, and then you wouldn't be trading aluminum windows for vinyl windows.

That's basically what we run into right now, is the aluminum windows are being traded away

for vinyl windows because we're afraid to seal the ducts, or make it mandatory. So we would encourage you to make it mandatory by 2005.

There was another question here in regards to Bruce talked about adjusting the standards for the new NFRC proposals. Do we know how we're going to do that? Is there any issues -- I don't know if anybody knows, but aluminum windows have been treated unfairly for ten years now by NFRC. You've been getting a 10 percent benefit ratio on aluminum windows that you didn't know, that actually was a bad calculation method that NFRC had in the simulation program.

So it has to be dealt with, and although it's proposed, I don't know how you're going to deal with that.

MR. ELEY: The intent is to keep the standards neutral.

MR. BJERRUM: Yeah, I would say that since we've been giving you all this free energy that you ought to calculate it back for the last ten years, say you did a good job, and then give it back to the fenestration industry and say, let's give you a little more glazing area.

The other issue, I want to question on

the 5 percent west-facing glazing. That's in the proposal. Is there going to be, for the home builders, the tract production home builders, is there going to be an averaging method? Because 5 percent glazing on the back of a two story house is going to make it really tough for tract houses. Is there an averaging method?

MR. PENNINGTON: I don't know what you mean by averaging method.

MR. BJERRUM: Well, the way that they would take the tract and you'd, I guess you'd have to take -- the original way is to take the worst performing. That's still going to be there then, I guess?

MR. PENNINGTON: Yeah, that's the performance standards approach.

MR. BJERRUM: Yeah, okay. And the only other question, I do want to see that -- we were talking about the multifamily being less than 10 percent, some 5 percent. That's against the Uniform Building Code. I'd like to see those statistics, because the Uniform Building Code requires 10 percent glazing.

MR. SPEAKER: That's why Mike was asking for the numbers on that.

MR. BJERRUM: I want to look at those numbers, too, because I think we ought to reevaluate them, if in fact, there's multifamily showing less than 10 percent, it's a violation of code.

MR. SPEAKER: That's a cave.

MR. BJERRUM: That's my comments.

MR. ALCORN: Okay, thank you, Ray. Dee Anne Ross, are you here?

MS. ROSS: Dee Anne Ross, DAREnergy Consulting. I'll pat you guys on the back later, okay, because I've only got three minutes.

Basically I will submit in writing some comments, editorial comments like the thing about waiving. And I also was concerned, though, when I was reviewing in great detail section 152. I noticed some changes that there was language that should have been struck, and language that should have been underlined, and it was neither. I can't tell you exactly right now because I don't have this copy marked.

But that concerns me a little bit that we have to pay that great a detail to it; that the edits aren't being marked correctly. I don't know what Building Standards Commission would do with

that if they saw it.

MR. PENNINGTON: We'll fix it before then.

MS. ROSS: Okay, okay.

MR. PENNINGTON: But tell us what your concerns are when --

MS. ROSS: Okay. My main -- I've only got like two or three main concerns. One is on multifamily water heating. Let me see if I can find it. It refers to -- this is in section 151F, it's page 141. And it's item 8B.

And it refers to a control on the recirculating pump when hot water is not required. And I wonder which type of control is that? Is that time and temperature? Is it demand? I don't know exactly what kind of control that meant, so I just wanted that clarified.

The tables for the climate zones 1 through 16, I suggest that you list duct insulation, even if it is R4.2. And on the domestic hot water heating, it refers to a section that should not be in there. It refers to a section that's for performance compliance.

And I want to know if there will be PV credits in the ACM. No? There won't be any

provision for PV credit. Well, I would like this put on record that I would like that, there to be credits.

And then my last comment is just that I second Bill Mattinson's comments on the glazing. Basically you're achieving energy savings on the back of affordable housing. I have quite a few clients who build houses with low levels of glazing. And it's just going to be a tremendous change in the standard in 2005 for them, because of that change. And I think you ought to leave the glazing alone.

MR. ALCORN: Thank you, Dee Anne. We would appreciate your edits in writing --

MS. ROSS: Okay.

MR. ALCORN: -- if you could, please. Next speaker, Nehemiah.

MR. STONE: Thanks. I want to compliment you on the work you've done, too. I won't take too much time on that because everybody else has.

I have a few -- I had three sets of questions on fenestration. One is that when we originally talked about fixing the fenestration area issue we talked about a unified method for

high rise and low rise. And I don't see that we've done that. We still have high rise using the same thing as the nonresidential, which is window/wall ratio. And low rise using percent of floor area.

And I think it would be advantageous for multifamily builders if we had a unified method. We proposed window/wall ratio. It doesn't have to be that, you know. We solve 95 percent of the problem going to the unified method of floor area.

The second issue, BSC -- Bruce's data showed the total energy per square foot much larger for multifamily than for single family, and I guess I need to question why, because analysis that I've done in the past doesn't show that that's the case.

And it makes me wonder about the comparison then of eliminating this loophole for fenestration area on multifamily. How accurate the data is on that, because you know, if we've got what you started out there with was 48 kBtu per square foot total energy for multifamily, and 32 kBtu per square foot total energy for single family, something's clearly wrong.

And if the total energy includes water

heating, which I assume it does if it's that high, then it's really wrong, because a lot of the multifamily gets a heck of a credit for having central water heating.

And the third set of issues is there was some indication that the U factors, or that the performance values were going to change to represent reflected new NFRC procedures. I know that most of that discussion is happening on the 13th rather than today. But the questions that have come up so far don't really get to the issue that I'm concerned about.

When the standards were created the cost effective analysis was done based on very specific technologies. And those technologies had U factors and SHGC values associated with them using the old NFRC method. And those were what were cost effective.

Now, with the NFRC procedures changing, and I don't want to get into a discussion about whether it's right or wrong, the way that they're changing, but now that they're changing it seems to me that everything in the standards has to be reevaluated on cost effectiveness using the new U factors and SHGC values, because everything was a

tradeoff. And everything still is a tradeoff.

And some of the fenestration technologies, their performance factors are changing by 10 and 15 percent. It isn't just 1 or 2 percent on everything. Some of them it is just 1 or 2 percent, but some things it's 10 or 15 percent.

And the direction that things are changing isn't uniform across all products. SHGC, some products, the value goes one way; some of the products the value goes the other way.

And I think if we're going to have an honest set of standards that is cost effective, then we need to take a look at the same technologies that were cost effective before, and analyze those with the new NFRC ratings.

One other question related to that one is I didn't see any changes on the high rise res values in the proposed standards. Am I missing something there? Or are we deciding that it's appropriate to change the values for low rise, but not for high rise? Did I miss something there on high rise?

MR. ELEY: I think they both have to be adjusted.

MR. WILCOX: On the issue of budgets, I'm not really sure what's going on there, Nehemiah, because we didn't actually explicitly model multifamily and single family -- glazing area. So I don't know what's going on there. I can figure it out --

MR. ALCORN: Any more comments, Nehemiah?

MR. STONE: No. Just that I actually did put those out as questions. I'd hope we could get responses to them before the day's over.

MR. WILCOX: I could answer one of those questions which is we initially intended to revise the requirements for glazing based on life cycle cost analysis. And then we found out that these new changes in NFRC ratings were happening, and sort of in the middle or at the end of the process where we have done the analysis, and realized that we didn't actually know that we could do an analysis that would make sense --

So I think that given the situation with NFRC and their schedule, we still don't know what the ratings are for any significant number of windows. I don't think we can give you anything for the 2005 standards at this point that's going

to be competent.

And so that's why we backed off on that.

MR. STONE: My only concern, if that's the position, my only concern is that we then have an underground standards change, because if you adopt the new NFRC procedures without evaluating what impact it has on the cost effectiveness of packages or the measures in there, you're essentially changing the standards without having a full proceeding on what the impact is.

MR. WILCOX: Well, we're proposing to leave the standards the way they are, requiring the same windows they currently require. We're not proposing to change the standard. And the fact that NFRC changes the ratings of the windows, does not change the standards.

MR. STONE: Well, there's two ways to interpret what you said, was if you're requiring the same windows then you have to change the values in the standards.

MR. WILCOX: That's correct, that's what we're going to do. That's what we're going to be doing.

MR. STONE: Okay.

MR. ELEY: But we're not going to redo

the life cycle cost.

MR. STONE: Okay.

MR. WILCOX: So we're going to look at the values for U factor, and solar heat gain coefficient, and adjust them to what we think would be the same window under the new rating rules, which is a nontrivial thing to do --

MR. ELEY: Well, one other comment. When we did the nonresidential analysis under AB-970, when we did the -- we actually mapped the criteria at that time to the NFRC number.

The actual analysis was done using WINDOW4.1 evaluation. So I think the -- and they're all internally consistent and everything. So I think all we really have to do is map the nonresidential numbers to the new NFRC value as soon as we know what that is.

MR. ALCORN: Okay, thank you, Nehemiah. Next, Gary Fernstrom, comments?

MR. FERNSTROM: I'll pass, thank you.

MR. ALCORN: Okay, thank you. Tom Trimberger, do you have any -- is Tom in the room? Oh, he stepped out, okay.

MR. TRIMBERGER: Tom Trimberger representing California Building Officials. Just

real briefly. There are a couple issues that I've been harping on continuously since we started, that I see as enforcement issues. I try not to get into the nitty-gritty and the complicated stuff, leave that to the rest of you guys.

But for the existing homes, I see duct testing with A/C change-outs is not included, but I guess it's still being looked at.

And requiring replacement windows to meet new compliance still butts its head against existing health and safety code. I know you've said you've had meetings with Housing and Community Development Staff. I don't know that you've reached any agreement that what you're proposing is allowable by them. So I'd urge you to continue that dialogue and try and get that resolved, you know, one state agency doesn't want to fight another state agency in public or anything. So, go do your fighting in private and get it done with.

We've also just briefly -- we haven't talked anything about res lighting. Is that going to be with the whole lighting --

MR. ALCORN: Yes, yes, that's right.

MR. TRIMBERGER: Other than that, it's

just -- did as much review as I could in the short time, you know, we've just had this for a little bit. And I'll reserve any other comments for the future.

MR. ALCORN: Okay, thank you, Tom.

MR. HOROWITZ: Bryan, can I ask a clarifying question?

MR. ALCORN: Sure, Noah.

MR. HOROWITZ: I just want to make sure I understand this. Is your concern relative to health and safety strictly a jurisdictional, or that these windows pose a health and safety issue?

MR. TRIMBERGER: Oh, we enforce portions of the health and safety code; it's called health and safety code as opposed to criminal code. You know, DMV code and whatever.

It's just called health and safety code. And a very common thing that we deal with is for an existing house there is state law that says you can build it back the way it was. You don't have to upgrade to make it more -- build it to a higher standard. And that's something that has to do with home affordability and things like that, which is very near and dear to the hearts of housing and community development for the state.

You know, we don't want to be caught between two different state agencies that have diametrically opposed issues. How are we going to resolve that? We have no way to resolve that. And I still see a large conflict.

MR. ALCORN: Thank you. Mike, do you have a comment?

MR. HODGSON: I'd love to make some comments. I don't have any card --

MR. ALCORN: Oh, I thought you were raising your hand there. I'm sorry.

MR. HODGSON: No.

MR. ALCORN: I misread that. Okay, next, Gary Farber. And, Gary, I'd like to apologize for not including you with the comments from CABEC earlier.

MR. FARBER: Gary Farber, Farber Energy Design. And first of all I want to thank you for the work you've done. Most specifically dealing with the multifamily residential water heating problem and tracking the system type, whether central or individual system. Something I've been talking about for a long time, as you know.

And it sounds like you're going to be making adjustments in the window efficiency

factors to track the NFRC changes, is that correct? Okay. Then I appreciate that, too. I was hearing some other things from some staff and I'm glad to hear that that's happening.

I have a question about the glazing percentage change. Changing the percentage from 16 to 20 percent. Was life cycle cost analysis looked at, as to how that impact of larger glass areas would affect cost effective measures?

MR. WILCOX: I think it's our opinion that the impact is minimal. That, in fact, there is very little impact even on what's cost effective for glazing in the glazing area. That the same windows are cost effective if you have 8 percent or if you have 20 percent as far as it can go.

MR. FARBER: How about how it might affect other measures such as air conditioning efficiency? If you've got larger glass areas. Was that looked at?

MR. WILCOX: Not specifically. I'm not sure how you'd do a life cycle cost effectiveness on that, but --

MR. PENNINGTON: Those are set by federal law.

MR. FARBER: Okay, as to what, the minimum -- it just seems like if you have a larger glass area that that could impact what is cost effective minimum effective efficiencies for various measures.

And I'd just like to say if we're going to make an adjustment on the glass area we really need to look at the whole picture a little bit more holistically as to, you know, what is cost effective.

And I think until we can do that I would echo what Bill and Mike and others have said, that we really should keep the 16 percent in the inland climate zones, as has been pointed out, even by staff -- it doesn't, you know, people are building what they want to build anyway, so I don't really see any good reason to make this change at this point.

As far as multifamily goes, I really do think strongly that we should treat multifamily separately and have a separate glazing factor. To have multifamily have 20 percent, and then track down from there. I mean that's just like way too large of an allowance for multifamily to begin with. And, you know, I don't think we should be

balancing one against the other. I think we really need to come up with a, you know, 12, 13 or 14 percent standard, whatever the data seems to indicate is reasonable for multifamily.

And in that regard I'd like to see, I think Nehemiah was saying, see that be carried over to high rise multifamily, as well. I'm doing a very -- well, not very large, but a five story, 157 unit, five story project right now. It's got walls in eight directions. It's a fairly complex design. And to have the glass area be regulated as a function of wall area is, frankly, you know, no one's going to be checking that.

And one good reason to have the glass area as a function of floor area is that it's actually a much easier check for the building departments to make; to see whether the ratios seem reasonable in your calculation.

I think it's probably also true, as opposed to nonresidential, that in multifamily the glass-to-floor ratios don't tend to vary all that much whether it's low rise or high rise anyway.

So I would really like to see all multifamily just have one requirement, and based on floor area. And I'd also like to see, as Mike

was saying in his proposal, that under a certain percentage that credit is accrued for having reduced areas.

I think there's something really important to be said for a standard that seems fairly rational. And in nonresidential, you know, the area floats between 40 and 10 percent. And it's difficult for a lot of architects to understand. And we also deal with that in high rise residential right now.

And I think, you know, even if the data shows that it's not really worth that much, I think it's worth a lot just to have a standard that appears to be a little bit more rational. The energy use and glass area has some relationship to each other.

The last thing I had -- this way -- I like consideration of the idea of just eliminating the whole distinction between high rise and low rise multifamily. And perhaps have, if there's a need for a standard at all, maybe for a small number of units would be under what's now considered low rise standard.

But, otherwise, put all the larger multifamily, whether it's two, three, four or five

stories, whatever, all in one standard. And the reason I say that is for many reasons. One is that system types don't tend to vary all that much, whether it's three stories or five stories. We're typically seeing the same type of systems anyway.

Another really important reason is that by putting them all under -- or most of the larger ones under one standard, which I guess would be equivalent to the high rise now, we can put a lot more of the lighting energy under the code.

I was talking to Mazi Shirakh a few days ago about this. And, as you know, there's been a big effort to incorporate more lighting to regulate it, such as in unconditioned buildings and outdoor lighting.

Evidently lighting that is currently exempt in common areas of low rise multifamily did not get into that process, and I think this is really -- thing to consider is just getting it into the process by putting larger multifamily, regardless of the number of floors, into a standard that deals with common area lighting.

So, that's my comments.

MR. PENNINGTON: What do you mean by

larger multifamily?

MR. FARBER: Well, we have to decide what the number would be, but, you know, I was thinking maybe like 20 units or more would be under a larger building standard. And under that would be under the smaller building standard similar to the current low rise residential.

I'm just saying most larger multifamily would simply be in a larger one which would use the DOE2, you know, process, so we could incorporate common area lighting. And I think that would be an important thing to consider.

MR. ALCORN: Thank you, Gary. The last person to comment on glazing areas was Mike Hodgson.

MR. HODGSON: A couple general questions. A lot of work's been done by the consultants. It's very admirable, and I think it's time for a lot of us to start to digest it, or at least digest it better.

But regarding fenestration, I think we've been fairly consistent over numerous code changes is that our code is relatively complex. Simple is better for the building industry.

And currently, in the last two years,

there have been studies by both DOE and PNNL that showed that codes without glazing restrictions have better compliance and better energy savings.

So I think, you know, outside of California there are other energy code documents that basically come to the conclusion, remove glazing restrict and get better energy codes. And we agree with that.

In fact, DOE is currently proposing the next version of the IECC without glazing restrictions. So, I think we're kind of going down our own path, making things more and more difficult and more complicated. The building industry would like to see the code especially as it relates to fenestration, which is a market-driven issue, not an energy-driven issue, to be very sensitive to the energy issues, and the peak load issues, which are very important to our state.

But in addition, realize that it's not a matter of energy choice, it's a matter of first cost and it's also a matter of preference of the marketplace.

So, I think to go a little contrary to what people have said, I think the building

industry's opinion is remove the glazing restriction. You'll get a better code. You'll get better enforcement. And probably, as other studies have shown, you'll get better energy savings.

So, just on the fenestration issue I think it's an interesting proposal. We'd like to look at its impact. And I think, as other people have testified, have requested, you know, what is the impact on the industry, what is the impact on first costs. We'll look at that, but I think it hasn't gone far enough. I think you should just remove the restriction.

And I'm not sure if you're familiar with those studies. We'd be happy to provide them. They've been in the public for about the last 18 months or so.

COMMISSIONER ROSENFELD: Mike, I have a question for you. I don't understand what the concept is -- I haven't seen the studies -- of a better energy code, or better compliance. Can you just amplify on this point?

MR. HODGSON: Sure. There was a study by, I believe it was PNNL studied four or five states that had energy codes. And they compared

energy codes among the states. And some codes had very specific requirements and they looked at two issues. One issue was did they have a glazing requirement. And the other issue was what was the level of compliance.

And they went through and came to the conclusion that the less complicated the code is, which I think is a fairly straightforward conclusion, the easier it is for the home building industry to implement. And the more people that implement codes, the greater the energy savings.

And that was a DOE study --

COMMISSIONER ROSENFELD: The trouble with that is if you make an extremely loose code, then everybody will comply. Like, I mean, I can say all cars shall get less than 50 -- less than 10 miles per -- I'm sorry, better than 10 miles per gallon, and everybody would comply. And we wouldn't have a CAFE problem.

But I don't really understand.

MR. HODGSON: Well, I think the best example possibly was Oregon, which had a fairly restrictive code. Had fairly restrictive window requirements for U value and the solar heat gain coefficient, but not for glazing percentage.

And I believe they made, and I'm going to have to go back to the study, Commissioner, but I believe they said it was equivalent to the '98 IECC. And there was better compliance in that state without glazing requirements, but they did have specific U value and solar heat gain requirements, than in states that were more restrictive in the way that they regulated glazing.

MR. WILCOX: When you say glazing requirements you mean area?

MR. HODGSON: Glazing area requirements, yes.

MR. WILCOX: Glazing area requirements.

MR. HODGSON: Like 15, or 16 or 20 percent glazing.

MR. RAYMER: It didn't lead to a huge spike in the use of glass at all. As a matter of fact there wasn't one.

MR. WILCOX: That's right, we actually cited a comparison in the topic paper on that, that quoted that --

MR. MATTINSON: Was California one of the states they looked at, Mike?

MR. SPEAKER: Oregon and Washington.

MR. HODGSON: It was not.

MR. MATTINSON: Those are states that don't have cooling issues. They don't have the kind of peaking issues that we have. It's apples-to-oranges. And also those are states that have less mature energy code than we have. Just my opinion.

MR. RAYMER: A follow-up response to one of the comments made by Commissioner Rosenfeld. Since the mid '80s and throughout the '90s the use of the performance approach has skyrocketed. The prescriptive packages really dropped. Everybody's aware of that.

But it was very clear to us when we started our energy training, intensive energy training, four to five years ago that I don't want to say it's the fault of the performance approach, but the complexity of the standards, time after time, has created a huge disjunction between those designing the homes, those implementing the standards, those purchasing the products. And it was leading to a rather abysmal compliance in regions.

And through simplicity, and I'm not saying watering down the standards, but through

simplicity that can -- compliance can be vastly increased. We've shown that.

The problem with the 16 percent versus 20 percent, all of these values were chosen in political negotiations in the mid '80s. And that's just a matter of fact. Some groups wanted 12 percent; others wanted 20 percent; we ended up with 16, halfway. That's how it was chosen.

It never ever mirrored production housing in northern California. So consequently whatever set of standards -- create a problem of compliance analysis between CBIA and the Energy Commission for many years was that the very base package that we would use in our analysis is with one that was being marketed to the public at that given time.

And so whatever we were using to base our marketing package on was already at a deficit with the standards. And so we had to, because of the increased area of windows, we would have to correspondingly increase the air conditioning, higher insulation, et cetera, tighter ducts, to make up for these differences.

Once again, mirroring what Mike said, we have no evidence whatsoever to suggest that

there's going to be any increase in the window area from this provision.

That may have been so in the early '80s, but not now. The design has worked itself out. The decisions that are prompting the design, and particularly the vast majority of houses right now, which is production housing, it's not based on a simplistic change in the energy standards would get made. I don't even see that having a hiccough in production housing.

Also, just in -- we do plan to -- we've already started our impact analysis using all the provisions that are coming in. We do want to get our hands on the newest version of MICROPAS as soon as possible. And we'd like to start working with the CEC making sure we're doing it correctly so that by the time we hit the January meeting we've got a firm handle on where ultimately all of this leads.

We're not just talking about a change in windows. We're talking about all of these features, together, just like we would with any other change to the standards.

And so we're going to be looking at the bottomline, and where we're at. So right now

we're just kind of getting started in all this, but, thanks for getting the computer analysis performance to us as soon as possible.

MR. ALCORN: Thanks, Mike, and Bob, also. Are there any more -- that sort of wraps up all the cards that were filled out for the fenestration issues. Are there any more comments on that before we move on to other miscellaneous subjects?

MR. GABEL: I have a quick question for staff. On page 162 of the draft standard, it talks about alterations; and it talks about total fenestration area requirements of the prescriptive packages applying to alterations.

And I wonder if you guys could explain the thinking there? In other words, are we talking about alterations not increasing glass more than the prescriptive allowance, or something like that?

Total glass? So that if a house already starts out over the prescriptive allowance, you can't add more glass to that house unless you do a performance analysis before and after to show equal energy?

Okay, thank you.

MR. DODD: Hang on, Mike. It doesn't say you can do the performance analysis --

MR. ALCORN: Martyn --

MR. GABEL: Page 162.

MR. DODD: You better re-read that. Doesn't show you can show before and after. Okay, what you're going to do is if you're going to add glass, the way I'm reading it, it says that you've got to do the portion where the glass is being added, you're going to have to analyze that as though it was new construction and weight your budget.

So if you take a whole house, you go through and you're adding new glass, and you're adding additional glass, then you'd have to use the existing or the current budgets.

MR. GABEL: Yeah, I think without working it out today I think we just need to revisit and carefully define how this method is going to work in practical terms for people who do want to add glass to their house, and how it's all going to sort out.

MR. WILCOX: CABEC isn't advocating increasing glass area in houses, are you?

MR. GABEL: No, we're just advocating

understanding what the staff means by the proposal, actually.

MR. RAYMER: Bryan.

MR. ALCORN: Bob.

MR. RAYMER: Bob Raymer. In my capacity as Chair of the Building Standards Commission's building and fire code advisory committee, this gets away from energy standards, but it could have an impact on the proceeding.

And that is the Building Standards Commission and a host of state agencies are currently involved in what looks like it's going to be a very lengthy administrative process. And that is the picking of what national building code is going to be used as the basis for California's building code. And the same thing goes for the fire code.

That is probably going to go into extra innings given yesterday's workshop at the Building Standards Commission. I would strongly advise that the Commission resume attending the coordinating council meetings that occur on a monthly basis with the Building Standards Commission, simply because we're looking at an effective date of the 2004 codes that will be

somewhere in the middle of 2006, not 2005.

And so that's very common knowledge now, but I've noticed that for the last three meetings there hasn't been a representative from the CEC at the coordinating council meetings. These occur usually the first Wednesday of each month.

And I think the next one is planned for December 4th. They're going to be talking about the process. But the timeline that was laid out yesterday is very clear. And right now I don't think there's any hope for getting an effective date for the standards anytime in 2005 the way they're heading right now. And they seem to agree to that.

MR. ALCORN: Thank you, Bob. Gary Farber.

MR. FARBER: Gary Farber. After I made my remarks I started thinking about the 16 percent versus 20, and there's good arguments on both sides.

I understand the idea of raising it to 20 percent will allow more buildings to use the simple prescriptive approach.

I started thinking about have we given thought to the idea of having, keeping 16 percent

and then coming up with a 20 percent package that simply has one or more, you know, tweaks to it? You know, for instance higher your air conditioning efficiency, or higher fenestration efficiency so that we can -- a grand compromise here. Just wondered if you thought of it.

MR. ELEY: It's been considered.

MR. FARBER: It has been considered?

MR. SPEAKER: That's a good idea.

MR. SPEAKER: I think it's an excellent idea.

MR. ALCORN: Okay, thank you. Looks like we're going ahead now and start taking some of the miscellaneous comments that are not directed towards the fenestration. And we'll start off with Michael Day, who's got four or five separate issues to hit on.

MR. DAY: Do you want them all at once?

MR. ALCORN: Yeah, actually I think we're going to take them all at once, because they're getting sort of miscellaneous now.

MR. PENNINGTON: In sequence, though --

MR. DAY: In sequence.

(Laughter.)

MR. DAY: Michael Day with Beutler.

First off, thank you again for the work that you've done on this. A lot of time and effort put into this.

First issue that we'd like to bring up is charge verification. The charge verification was originally added as, from what we remember, as a compromise to the equipment manufacturers who didn't want a mandated or a highly encouraged TXV without some other method of getting it.

However, for systems that have thermostatic expansion valve, we're opposed to charge verification. It's an expensive and laborious process. In cold weather there is pretty much a best guess portion put into it.

The TXVs in most literature are thought to compensate substantially for improper charge. And while there does seem to be a difference between some research, it does not seem clear that the marginal difference of charge verification is cost effective in systems with TXVs at this point.

TXVs are easy to verify that they're there by HERS rater. It's boom, it's there; boom, it's not there. And we'd like to see some more analysis on this because it doesn't look --

MR. WILCOX: I guess the question,

Michael, is --

MR. DAY: Go ahead, Bruce.

MR. WILCOX: -- what makes you think we're going to require charge verification for systems with TXVs?

MR. DAY: I thought that I was reading that in some of the literature that was posted on the website.

MR. WILCOX: Okay, well, if it happened it's a mistake. We didn't intend to do it.

MR. DAY: Oh.

MR. WILCOX: As far as I know we didn't intend to do it, so point it out if you see something that says that.

MR. DAY: Absolutely.

MR. WILCOX: Okay.

MR. DAY: Another item comes down to -- actually a couple items revolving around right sizing. One of the things that has been recognized in the right sizing concept is that it encourages a less energy efficient envelope.

By constructing a less energy efficient envelope that still meets the requirements of Title 24, and is compliant, then you get a larger size of air conditioning unit. We have

substantial questions about who will be policing this measure.

Also on the same floor plan within the same climate zone you could have the same home builder needing different sizes of equipment only a few miles away. From Sacramento up to Roseville and then on to Lincoln, the design day changes from 98 degrees to 100 to 104 degrees. So you have some substantial variation even within a few miles. And we think that that will end up making it much more complex on the job sites.

We receive over 1000 questions a year from home buyers regarding the size of the system. To date, to nobody's -- to anyone in our shop's knowledge, we have never been accused of putting in an air conditioner that was too large.

There's a real question here. It is there will be a substantial consumer backlash against this concept. They already think, a substantial number of home buyers right now think that their air conditioning systems are too small.

There will be a lot of anger and angst directed at builders and lawsuits, and if the builders are getting them. Maybe they can't direct the lawsuit back to the CEC, but they can

sure direct the anger and energy of the home buyers back at them.

The utilities already are the -- at least ones that we deal with, already have programs in place to restrict ungodly larger sized units. And we encourage continued reliance on these trained and competent individuals and organizations.

MR. WILCOX: How do you define ungodly?

(Laughter.)

MR. DAY: Another part of this within the whole right sizing milieu is individual orientation. Okay, I should be more engineering and less literary when I'm constructing my comments.

There seems to be a big move towards pushing individual orientation compliance. This presents an extreme burden to production home builders. It's not a problem for custom home builders, because every custom home built is going to need it's own Title 24 runs anyway.

But for production builders it is a substantial problem. Streets curve. Therefore, where are you on the street, and how do you measure it, and what do you do with this unit

versus that unit?

You're going to require multiple runs for the same floor plan on the same project.

MR. MATTINSON: Excuse me, is that proposed?

MR. WILCOX: Yeah, Mike, what are you talking about?

MR. MATTINSON: That's not an issue. It's worst case orientation, as I saw it published. Worst case is allowed.

MR. ELEY: You size your system for the worst orientation.

MR. STONE: They solved your problem already.

MR. DAY: Rolling on, --

MR. PENNINGTON: We need you to comment on our standards, rather than --

(Laughter.)

(Parties speaking simultaneously.)

MR. WILCOX: We didn't intend to. If we did something, let us know.

MR. DAY: And lastly, two items. Okay, is integrated ventilation, are we going to do anything with that?

(Laughter.)

MR. DAY: Let's just open it up here. I'm reading from the wrong sheet of music. Is integrated ventilation part of this?

MR. PENNINGTON: There's no proposal.

MR. DAY: R8 duct work.

MR. PENNINGTON: Yes.

MR. ALCORN: There we go.

(Laughter.)

MR. DAY: All right, we found one. Okay. We understand that it has gone away from the realm of mandatory. That's a good thing.

MR. PENNINGTON: It was never proposed as mandatory.

(Laughter.)

MR. SPEAKER: And that is a good thing.

MR. DAY: And that is a good thing. And we agree with that being a good thing.

As previously discussed, we have some major differences in the cost effectiveness analysis of the R8 duct work. But as some of the emails the people around here have been involved with, we think that the -- duct proposal and addendum as an alternative proposal with a few changes looks very promising in both flexibility and cost analysis.

We think that it will encourage higher levels of insulation in the attic. It will probably encourage a wholesale change from cellulose to fiberglass insulation in the attic for those that do it.

It has flexibility, and it's very cost effective, and yields very good results. So we're very hopeful that that can be recognized as a performance measure within the upcoming standards.

Thank you very much.

MR. ALCORN: Okay, thank you, Michael. Let's see, next, Dave Ware, do you have some comments you'd like to make?

MR. WARE: Dave Ware representing Owens Corning. I submitted a letter that was outside, and I'll just run through this very quickly.

The R8 ducts proposal on the residential standards; 4.2 is the basis. And what I'm basically suggesting here is because it was shown to be cost effective for both the nonres and the residential side, why not make R8 ducts requirement uniform in all the packages across the board.

That way you would increase the enforceability. There's no confusion out in the

field. And there's consistency between the standards.

The other comments I have affect the ACM manual. And particularly the insulation installation quality section.

MR. ALCORN: Dave, I'm sorry, can we interrupt? There was a question on your last point.

MR. WARE: Oh, I'm sorry.

MR. RAYMER: Bob Raymer, CBIA. Were you suggesting that the R8 be mandatory?

MR. WARE: Yes.

MR. RAYMER: But we just told Michael Day that --

MR. WARE: R8 is incorporated in the packages and becomes part of the standard budget. But in climate zones 6, 7 and 8, 4.2 is the reference. And so, for ease of enforceability and understanding of the marketplace, notwithstanding the results of the life cycle cost savings analysis, those climate zones 6, 7 and 8, while they weren't shown to be cost effective, that is R8, they were very close.

And so I'm saying that if you include the enforceability variable, so to speak, into

that, that it would make it much easier to say that message back to the HVAC community, back to builders, and back to consumers in regards to what the duct requirement would be.

In the draft residential ACM manual, the new section regarding insulation installation quality, I've identified by page number a number of situations in there that I think need some clarification and some improvement.

Now I got to get on the right page here. The first area has to do on page 1 of that section and deals with the terminology for draft stops. Draft stops is a building code terminology, and it's being incorrectly used here. I've submitted a number of different comments on this, and this continues to creep into the criterion of procedures for identifying installation quality.

And I think it's unfortunate, because there will be confusion in the marketplace. I believe a better terminology to use for what's trying to be described here is just the air barrier system.

When you have those large soffit areas you want an air barrier provided there. But what you're calling this out is a draft stop, and

clearly that is not a draft stop.

And you go further in that section to confuse it with the term fire stop. And fire stop is, again, incorrectly being used here in the context not only of insulation material, but ought to be deleted from this all together. Fire stops deal with penetrations in hourly assemblies. And so it's just a wrong use of the term.

So, anyway, I think collectively if you want to keep the context, then we can go round and round and look for better choices of words. But it's just not correct.

MR. WILCOX: Well, we're happy to improve the wording, Dave.

MR. WARE: Okay.

MR. WILCOX: We put in the reference to fire stops because your friend there asked us to. So, --

MR. COTTRELL: We changed the -- well, it's an improvement but it's still not right, as Dave -- and I stand corrected, too. So, we'll -- and I --

MR. WARE: We'll work on Charles.

MR. COTTRELL: There are differences in the national code and then the way, I think,

California may define it, also.

MR. WILCOX: I think it's very important to get the wording right so people know what we're doing. And if we can come up with a new word that's clean, that's fine.

MR. COTTRELL: Clarify that.

MR. WARE: Further on page 3 of that section, talking about loose-fill wall insulation. And the same concept shows up in blown-in ceiling insulation on page 5 of that section, where you have installers only are required to provide a density measurement in one place in the building.

First of all, my comment is that the procedure implies that the measurement only will happen by the installer, or is only required to happen by the initial installer when compliance is being showed for high quality insulation.

So my first comment is if the Commission is desirous of improving installation in standard practice, then make installers -- require installers to do a density measurement, at least one, but preferably three, for all installations across the board, period.

There's no reason to require -- there's no reason not to have that a requirement. And

many building energy codes throughout the country require that. Oregon and Washington require that. That's a normal standard practice whenever blown-in wall insulation is done. That's the only way you can verify what the installed R value is.

So, again, not to belabor this issue, but what you're implying here is that you only do that when high quality installation is being shown. And our feeling, my company, is that that ought to be a requirement. And we ask that of our installers across the board everywhere.

The next section is on page 7 of that area. There's a reference to the draft stop again.

And the last comment I have is on page 8; it has to do with attic rulers. The way I read this again is that you're only requiring attic rulers to be placed in the attic when the high quality installation compliance credit is being shown.

Well, if the -- you know, I can understand that, but why not require the same for every installation? You're not doing the enforcement community any benefit for standard buildings by not requiring that.

The whole idea of that is some verification that can easily be shown presumably to consumers and to the builder, and then ultimately to the HERS rater. But why not have that right off the get-go for site inspectors for all installations.

And then related to that is the rulers should not have simply just the inches or depth, but must have the R value. It's the R value that you're complying to, not the inches. And so that is tantamount to those rulers being even useful in the first place.

I had a comment also on here I didn't mention, but I want to mention real quickly. Early on in the ACM manual on page 64 you describe the modeling procedure that would be used for receiving the compliance credit for a quality installation.

My more global opinion of that is that you're creating a compliance credit which is a burden and a very costly and time consuming process to verify something that should be right in the first place.

And by doing this kind of approach, while I'm not wholeheartedly against the approach,

the problem is that you've not established, and you've gone away from, any consideration of improving standard practice.

There's been no mention of working with, for instance, Sacramento County to get them to require an insulation inspection. There's been no thought or recognition that there are very easy mechanisms without creating a cost burden to the home buyer and to the home builder to maintain construction quality as it should be, without creating a compliance gimmick, so to speak.

And lastly, related to that, it's difficult to identify whether the approach that you're taking is even appropriate without understanding what the impact, the energy impacts are of that modeling approach. We don't have access to that. You haven't shown any impact of that.

So I would request that at least at the next workshop or whatever the next process is, that you have some analysis of how that approach, what the effects are on the energy budgets, and with different building sizes and energy scenarios across different climate zones.

Thank you.

MR. WILCOX: We did do one set that I presented earlier today that will be posted.

MR. WARE: Oh, it will be posted on the web?

MR. WILCOX: That measure comparison includes construction quality.

MR. ELEY: The negative point system.

MR. WARE: The negative --

MR. SPEAKER: You were out of the room.

MR. WARE: Oh, okay.

MR. ELEY: Oh, you were out?

MR. WARE: Okay, I apologize, okay.

MR. ALCORN: Okay, is that all your comments, Dave?

MR. WARE: Yes.

MR. ALCORN: Okay, thank you. Charles Cottrell, did you have some related comments?

MR. COTTRELL: Yes, I do. Charles Cottrell representing NAIMA. Just some minor comments.

First, I'd like to thank the CEC for allowing NAIMA to participate in the development of this high quality installation protocol. We spent a lot of time on it and I think there have been a lot of improvements. I still have just

some minor comments.

One that was already addressed was the issue of draft stops and fire stops, and making sure we're consistent either with the California definitions and the understanding -- and maybe Tom Trimberger could be helpful with that process. I'll check with him, too.

But, one of the issues that we talked at length about and I still would like to have considered is the issue of side stapling versus face stapling. It isn't specifically prohibited by the language in the protocol, but then again, I think if the criteria are used very carefully it would probably prohibit that practice.

I've submitted some test data that was done by Owens Corning, in fact, that shows that side stapling does not reduce the R value; and it's not also any cause for fire hazard.

And likewise, I've looked over the Bill Brown test data. I guess I would just ask, is there any other data that NAIMA might be able to provide that would be helpful in answering that question?

My interpretation of Bill Brown's test data is that it does not specifically address side

stapling, and probably, you know, is an absolute worst case model of what could happen if you improperly installed a bat. But, I guess I would just ask that question in general, and maybe we can, you know, provide something else at a later date.

The other thing I wanted to discuss was the equation on pages 3 and 5 of the protocol that discusses or is used to determine the dry weight of wet spray materials. I know that that equation was discussed in our conference calls, but I'm still not clear on the origin of that. And it's, you know, accuracy in determining the dry weight.

My feeling is that until you have a stabilized sample that is, you know, dry, I would suggest perhaps a relative humidity and time table that shows how long; then you would be able to pull a sample and get the dry weight of that material. I don't see a way, other than that, even using the moisture meter, that you could accurately determine the dry weight.

One of the members on the conference call agreed to supply some data. Was that ever done? Or do you know, backed up by --

MR. PENNINGTON: I don't think we've

gotten that yet, no.

MR. COTTRELL: Okay. I guess I would just -- and not having done this, myself, but I would guess that using a moisture meter on a material that is not going to dry equally throughout, it would be very difficult to do.

It's not a homogeneous substance. You stick it in an inch. You may get a different moisture reading than in the middle or at the back. And I'm not sure, at least in the ICAA procedure that I ran that even that is discussed as to how to do that precisely. I may have missed something or not have all the pages of the ICAA document, but I can't find that protocol specifically.

So, I guess I would just like to offer to discuss that section in a little more detail at a later time if we could.

Then the only other thing I had were some minor, what I consider typos and clarifications that we can discuss at some other time. I'll provide it in writing.

MR. ALCORN: That would be great. Thank you, Charles.

MR. COTTRELL: Thank you.

MR. ALCORN: Let's see, I think, Misti, you have comments you want to make?

MS. BRUCERI: Actually, I'll pass. My comments were related to ducts in existing homes.

MR. ALCORN: Terrific. Okay, thank you. Gary Fagilde; you had some comments on duct sealing, I think?

MR. FAGILDE: I pass my comments to existing homes.

MR. ALCORN: So did you want to say something about the existing homes? Or --

MR. FAGILDE: No, it was for existing homes, not new construction.

MR. ALCORN: Okay, well, that's okay. We're taking miscellaneous comments now, so, yeah, it would be appropriate for you to make your comments on duct sealing.

MR. FAGILDE: My name is Gary Fagilde; I'm with Pacific Gas and Electric at the Stockton Training Center, Energy Training Center in Stockton.

PG&E hopes that the Commission considers the link between house tightening and combustion appliance safety testing. Currently PG&E applies a combustion safety test which we feel is a very

complete test in terms of customer safety. And we hope that the Commission considers applying that as a possible test-in and test-out procedure in existing homes when ducts are tightened, and the potential for reducing natural air changes in the home becomes significantly more important.

MR. ALCORN: Terrific. Are there any questions on --

MR. FAGILDE: That's -- comment.

MR. ALCORN: Okay, thank you, Gary.

MR. McHUGH: I've got a question for Gary. This is John McHugh with the Heschong Mahone Group.

MR. ALCORN: John, pardon me.

MR. McHUGH: Sure.

MR. ALCORN: Thank you.

MR. McHUGH: Gary, could you describe approximately how much additional cost is associated with the combustion test?

MR. FAGILDE: The test, itself, as far as cost, I'm probably not the best person to ask, because I'm the training portion of PG&E, but our central inspection program probably has more accurate data on that. I apologize for not having that.

MR. McHUGH: And approximately how much time? Do you have a feel for that?

MR. FAGILDE: The average test is going to take about 25 minutes or so. And it can be upwards of 45 minutes or more on very large homes with lots of appliances.

MR. ALCORN: Thank you, Gary. Misti, do you have comments on ducts in existing and new? Okay, you're passing on that. Okay, thank you.

All right, let's see, Dave Springer. Down here you've got some comments on residential gas cooling.

MR. SPRINGER: Thank you. Dave Springer, Davis Energy Group. I wanted to thank you for getting the corrections to gas cooling into the standards tables. And that was all done correctly. There were a few minor edits that I have for you on that that I can give you in hard copy.

But one thing that was notably missing from the ACM manual was the calculations for residential absorptive cooling, which I presume will be forthcoming after review of the environmental report that we submitted.

MR. ALCORN: Yeah, we got that at such a

late point that there was no way we could consider it.

MR. SPRINGER: Okay.

MR. ALCORN: So that will be the next review.

MR. SPRINGER: Okay. And also we had a question about what would be the easiest comparison case for residential gas cooling. Would it be electric air conditioning, or would it be gas cooling?

MR. ALCORN: Okay, I thought that was part of your proposal, and I have lost track of what the proposal was.

MR. SPRINGER: We were proposing electric air as a standard.

Okay, well, we look forward to receiving your comments on our revised code change proposal with the environmental report included.

MR. ALCORN: Thank you, Dave. Nehemiah, I've got down here that you've got a couple of issues you want to touch on.

MR. STONE: Right. Two questions and a comment. One of the questions on maximum cooling size. Is that to be applied to multifamily, also? And if so, is it to be applied to high rise

multifamily? And if so, is that based on the worst orientation apartment within -- buildings?

MR. WILCOX: The way it's written right now it applies to multifamily, but not high rise multifamily.

And if you do -- our assumption is that people are going to do the normal approach in low rise and calculate the whole building at the same time. But if you were to do individual units and you could show that you had a number of identical ones, perhaps should do it that way, --

MR. PENNINGTON: You can do it either way.

MR. WILCOX: You can do it either way.

MR. STONE: That one points out another reason for having a unified multifamily set of standards, which is the proposal we made at the beginning of the process and we'd like to keep it on the table for the next round. I know it's too late for this round.

MR. SPEAKER: It's really hard to hear you, Nehemiah.

MR. STONE: Sorry. The second question I have is you made the statement that PV alternative in the code was, there was a CEC

decision not to include that.

I'd like to ask the question of whether that is kind of a universal decision that we're ont going to do that ever, or it wasn't included in the budget for this round of standards, but if somebody comes along with a methodology for you, then it's acceptable? Or what the nature of that decision is, the --

MR. PENNINGTON: So that was originally proposed as one of the multitude of proposals that was made in October and November of 2001. And the Commission reviewed all that; decided what the scope of the standards could be. And that didn't make that cut. So, you know, that's when the conclusion was originally made.

We view there to be a number of problematic issues related to having photovoltaics get compliance credit in the standards. Basically there's a -- you're not going to drive someone to go to PVs from some limited credit in the standards.

But the reverse could be quite true, that if someone had decided, for some reason, to put PVs in the standards, they could take a sizable credit and reduce the measures that

otherwise would be necessary.

And then one further comment is that particularly for low rise residential, insuring that the PV system is not going to get shaded by someone's tree is an incredible uncertainty to be assigning a generous credit to that at the time of construction, when you really have no idea what's going to be the case ten years later.

It just seems to us that there's a whole bunch of problems related to this.

MR. STONE: Well, let me respond very quickly to that. We dropped it because of the, you know, hearing the decision that the Commission didn't want to go forward with that this round. And we've been approached by a couple other entities who want to pick it up and run with it again.

And all of the uncertainties you talk about, there's parallels all through the standards. I mean currently as an issue of fairness, if you are getting site energy for your solar water heating, you get to take credit for it, because somebody developed the methodology and somebody developed the criteria to say here's when it can apply, and here's when it can't.

You can say the same thing for PV. If all of the criteria, the inspection criteria, the installation criteria, if all the criteria were there, there's no reason that PV couldn't be on an equal footing with water heating.

And I agree with you that you're not going to be driving people to PV because you're giving them a credit in the code. Anybody smart about PV is going to make their building extremely energy efficient first.

But that's not the main reason for including it as an option in the code. Like many other things, the first step is to get it in as, you know, this is a tradeoff. You can trade it off. The next step would be to say, well, okay, now we're going to baseline it. And if you don't have a PV system, then you got to make up for that energy somewhere else.

Because we expect with California's energy infrastructure homes should be going in with a PV system. Or you should make them more energy efficient yet.

So, you know, --

MR. ALCORN: You're going to require PV systems in the basecase, is that what you said?

MR. STONE: What I'm saying is that your fear that people will be trading things off, you could make that same argument about almost anything else that's gone into the standards.

But the purpose is not to get it into the standards so people will do this as a tradeoff. The purpose would be -- that's the first step. You can't get something in as a baseline unless it's first put in as a tradeoff, as an opportunity.

Take a look at tight ducts, for example. Tight ducts went in first and the same arguments were made by people at that time. You know, if we allow tight ducts as a tradeoff, then people will be getting rid of more permanent energy efficiency features in the building.

And the same thing was said about, you know, low-E glass. If we allow that in as a tradeoff, and it's not permanent, something else, you know, you'd be losing something permanent. You can make that argument about anything when it comes into the standards.

COMMISSIONER ROSENFELD: Nehemiah, let me -- I've had long discussions with Noah about this. And I think we should do it as soon as we

can. And I'm trying to get PIER -- to do a study on just the criteria that you're suggesting.

What little I know about PV, and I'm sure as hell not an expert, is that unlike ducts, the -- PV, or some of it, is extremely nonlinear. You shade 10 percent of the area and your output drops 90 percent.

And there are PVs with bypasses coming on the market. So there's some economic decisions to be made. And I think we're not in a position to do it right now. But I do agree that we have to consider this in some -- I just don't know whether we're ready for 2005 or --

But Bill and I have spent a long time talking about it.

MR. STONE: So if a third party did come with a proposal --

COMMISSIONER ROSENFELD: Sure.

MR. STONE: -- then it's not, you haven't ruled it out. One other point I'd like to make --

MR. PENNINGTON: They need to get the shading information right. What shading is reasonable to assume for production homes without any consideration for your neighbor's trees.

MR. STONE: Same thing applies to --

MR. PENNINGTON: No, it doesn't.

MR. STONE: -- thermal --

MR. PENNINGTON: It does --

(Parties speaking simultaneously.)

COMMISSIONER ROSENFELD: This is the first nonlinear problem -- generally a duct leaks 6 percent, it's only 2 -- 8 percent, it's only 2 percent worse than 6 percent.

In this case, the shadings are unpredictable, and you got a -- chance, Bill tells me, of getting -- of losing 95 percent of your PV.

MR. STONE: There's two kinds of technologies, and that's true with one. That kind of --

COMMISSIONER ROSENFELD: That's right, and that's what we --

MR. STONE: Right. And so those sorts of things, the same sort of criteria, you know, the same kinds or nature of criteria have been developed for solar thermal and can be in this.

The other point I'd like to make on it is this is not a standards change. According to the standards, such a thing is already allowed. It's simply a matter of changing something in the

ACM, because this is site energy.

The point I wanted to make, Bill and I talked about this yesterday. I'm done with my two questions, it's the point now.

In the residential ACM the requirements for field verification on HERS and the sampling requirements specify that you look at a subset of the dwelling units. In the residential manual it specifies that you look at a subset of buildings.

All of that makes perfect sense when you're talking about single family housing in a subdivision. It doesn't make any sense when you talk about multifamily where you don't have a whole bunch of buildings which look alike. What you have is a whole bunch of apartments inside one building that look alike.

If we want people to start using HERS ratings, either for the standards or for the utility incentive programs, then we need to have a sampling procedure that works for multifamily. I believe that what we need to have is something that's a subset of whatever we decide are the models, apartments within that building. That would bring the cost down to the range where people are actually going to use it for

multifamily buildings.

And I support what's in the ACM manual, which we're looking at today, and the way it's worded. I don't support what's in the current residential manual. And I would like to see us make a concerted effort to come up with something that works in terms of sampling for HERS ratings on multifamily buildings.

Thanks.

MR. ALCORN: Thanks, Nehemiah. Gary.

MR. FERNSTROM: Gary Fernstrom, PG&E. Just a comment on Nehemiah's comments. I thought that these were California's energy efficiency standards, not California's standards for self generation in buildings.

And even if the standards do have the capacity to consider solar photovoltaic onsite generation, I think it's important that when we do get around to thinking about how that might be included, it be included correctly.

Because solar photovoltaic energy is very expensive relative to the cost of making energy efficiency improvements in homes.

And I think if properly included in the standard, homeowners and builders would be driven

to do a lot more with energy efficiency before they would be driven to install solar photovoltaics.

MR. ALCORN: Thank you, Gary. We're down to our last 15 minutes. We've got four more commenters. So, if you last four could keep your comments to three or four minutes apiece, it would be appreciated.

Ahmed, you've got some comments?

MR. AHMED: Very brief. I just wanted to know, regarding the TDV, the last presentation at the workshop we had on TDV was back in, I don't remember, Charles --

MR. ELEY: April 7th.

MR. AHMED: -- April, yes. There was some questions raised regarding how the values were calculated, et cetera.

I was wondering if -- and HMG updated those, or they have remained the same since then. And the other thing is -- other question is whether or not TDV is going to be included into the standards, will the Commission have a workshop or a discussion on this in the future?

Because, Bill, you indicated that it's not been decided yet, which way --

MR. PENNINGTON: We're in a continuing proceeding here. We're having a workshop today.

MR. ELEY: Yeah. It's in the standard.

MR. PENNINGTON: It's in the draft standards.

MR. AHMED: I understand, but the final decision has not been made, right? You indicated today?

MR. PENNINGTON: We're in the middle of a proceeding here, and so there's another workshop we're planning in January. Then there'll be a rulemaking proceeding. So we're not planning any special event related to TDV.

MR. AHMED: For TDV? So if we have any comments, should we file any comments regarding TDV? Because TDV is not a part of the discussion today, that's why I was raising this issue.

It is implicit, but it's not a topic item is what I wanted --

MR. PENNINGTON: We haven't identified any topic items, and are open to comments on all aspects of the standards.

MR. AHMED: Okay.

MR. ELEY: You're free to comment on TDV.

MR. AHMED: Okay. So we'll file some comments, then.

MR. MAHONE: But to answer your question, no, we have not changed any of the values.

MR. AHMED: So they remain the same. Okay.

MR. ALCORN: Does that conclude your comments, Ahmed?

MR. AHMED: Yes.

MR. ALCORN: Okay, thank you. Tom Trimberger, did you have some more comments on res? Okay, thank you.

Gary Fernstrom, did you have any more comments you need to make, miscellaneous comments on res?

MR. FERNSTROM: Thank you, I've made all the ones I'd like to.

MR. ALCORN: Terrific. Thank you. And last, but not least, Bob Raymer, do you have any closing comments --

MR. RAYMER: I did.

MR. ALCORN: -- you want to make on res?

MR. RAYMER: No.

MR. ALCORN: Okay. Thanks very much.

Boy, that was fast.

MR. ELEY: Hungry, I guess.

(Laughter.)

MR. ALCORN: Okay, why don't we take a break for lunch and come back at 1:30. Thank you.

(Whereupon, at 12:35 p.m., the workshop was adjourned, to reconvene at 1:30 p.m., this same day.)

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AFTERNOON SESSION

1:45 p.m.

MR. ALCORN: I would like to welcome everyone to the afternoon session where we'll be talking about the nonresidential revisions to the building energy efficiency standards and the nonresidential alternative calculation methods.

I see a lot of empty seats around the table. I don't know if those seats are going to be filled. In the event that they aren't after a few minutes, those of you who are out in the audience and are going to be making comments, you're welcome to come to the table to make those comments.

I want to also, for those of you who weren't in the morning session, I would like to point out that Elaine Hebert, to my right here, has got some blue cards. And if you could take the time to fill out those blue cards, they're asking for your name and your affiliation. And what topic it is that you want to make comments on.

So, if you can hold up your hand if you have any comments. Elaine will give you the cards, and you can get those back to us as soon as

you can. Thank you.

We will start this afternoon's session with a brief overview of the nonresidential revisions which will be done by Charles Eley; and I think Mark Hydeman will be assisting with that.

So, gentlemen.

MR. ELEY: Okay. As with the morning session, we're going to just go through the measures very briefly, because they've all been heard in previous workshops.

I'll mention time dependent valuation again, because it affects both residential and nonresidential. And it is implemented in the draft standards. Everywhere the standards previously referred to source energy, it now refers to TDV energy.

The photovoltaic is another one. The CEC's plans are to not offer credits for PVs and a possible prewiring requirement is being considered, however, And the same is true with demand response controls. This is still being considered, but nothing is in the draft standard at this time.

One other change that was considered at the April 2nd meeting was to add some schedules

for modeling of nonresidential buildings. Schedules were developed from the NRNC database for offices, assemblies, schools and retail. These are not in the standard or the ACM at this point. And this is still under consideration. We're not sure which direction that will take.

Lighting under skylights. This will be addressed with all the lighting measures on November 18th, so I just want to put it here so that you know we're not overlooking this.

In terms of cool roofs, this measure was proposed by PG&E. It was heard on May 30th. I believe there was actually a supplemental report of July 18th, if I'm right, Misti. Section 143 of the standard has been modified to make cool roofs a prescriptive requirement for low-slope applications. Low slope having a slope of less than two-in-12.

And the tradeoff procedures in both the ACM and the building envelope tradeoff method have been modified to treat reflectants as a continuous variable. Previously the roof was either cool or it wasn't. Now you can enter the reflectance.

Now, the reflectance and emittance that's used for compliance has to come from the

Cool Roof Rating Council, through its standard procedure, CRRC-1.

In the AB-970 standards there's a reference to ASTM-6083, which is a durability standard for acrylic -- coatings. We're researching whether those same requirements can apply to other liquid-applied coatings. And there's still a question on the table there about whether that standard can be used for other liquid-applied coatings or not. We hope to get some input from some more experts. We've already consulted with quite a number, but the jury's still out on that one.

Section 143 of the standard has been modified to include a new set of criteria for relocatable classrooms. This is a separate table. The criteria is consistent all across the state. There's no variation for climate. The reason for that is because of the portable nature of classrooms.

However, there is an exception that a portable manufacturer can use the climate-specific criteria, the nonresidential criteria; but if that climate-specific criteria is used, there has to be a plaque on the relocatable saying that it's only

supposed to be used in a certain climate zone. So, relocatables are in the standard.

MR. AHMED: Question.

MR. ELEY: Yes.

MR. AHMED: The statewide standard for the relocatable, it's closest to which climate zone did you say?

MR. ELEY: Well, this was heard back in July on that. The actual requirements are -- I believe they showed that it was cost effective in all of the climates when they developed it, so -- but, is anyone from Davis Energy here?

MR. PENNINGTON: Basically the features that are the most significant in each of the climate zones are in that package.

MR. AHMED: No, I remember the workshop. We talked about lighting and all that. I was just wondering if the statewide standard, if it corresponds closest to say, climate zone 10, or 9 or 1 or whatever. That's okay, it's not important.

MR. PENNINGTON: It's more like a combination of 15 and 14.

MR. AHMED: Okay.

MR. ELEY: The next measure is for lay-

in ceiling insulation. This is prohibited under the draft standard unless the plenum height above the ceiling is more than 12 feet. And the conditioned space is less than 2000 square feet.

So this practice of using the t-bar ceiling as the thermal barrier is prohibited, or at least limited to very specific application.

In addition, we've modified the language so that it's clear that plenums are not considered attics, and are not required to be ventilated. This was always kind of a point of confusion with some folks.

There were several building envelope group four measures. Group four, these were the measures that were brought up at the first workshop last November, about a year ago. And the Commission made a determination for the group four measures that they were worthy, and that should be included in the standard, but that no additional research would be needed.

So, in response to the group four measures, we've made four changes in terms of nonresidential standard. In response to a recommendation from Gary Farber, we've placed a prescriptive limit of 40 percent on west-facing

glass. This is -- previously there was no orientation limits on the 40 percent. It could be all on one side or not. But this limits how much of it can be on the west side.

There's also a requirement added to section 118 that requires that roof insulation be placed below the waterproof membrane. It was called to our attention also by Mr. Farber that some people were putting insulating boards on top of the built-up roof so that the water could kind of seep through; and then that the thermal integrity of such a construction is not very good. So that's not allowed for compliance purposes.

The third bullet is that we've added insulation requirements for heated slabs. There were some insulation requirements for heated slabs previously, but they were sort of buried in the residential conservation manual, and not in the standard where they should have been.

So we've moved them into section 118 of the standard. And 118 actually applies to residential as well as nonresidential buildings, so it will apply to all heated slabs whether they're -- no matter what the building occupancy type is.

And the last bullet is something we may do. This is still under consideration. But there was a recommendation a year ago by John Hogan that we standardize our U factor calculations to be consistent with ASHRAE90.1, appendix A. And we're still looking at that.

The New Buildings Institute has developed acceptance requirements for many measures in nonresidential buildings. These were considered at the April 22nd workshop. And we have added an appendix to the nonres ACM. It's appendix N for nonresidential J, titled acceptance requirements. And there's a handout of this out in front.

And also, throughout the standards or sprinkled in the appropriate place, like under -- if you look under economizers, for instance, or under lighting controls, you'll find a reference that in order to give credit for that measure you have to follow the acceptance requirements in appendix in J.

And then there's a letter outside addressed to Tab Cummins from Jeff Johnson, which has a few additional comments about the acceptance requirements. I believe these respond to some

issues that Taylor had raised.

So I think, in terms of the people who have weighed in on this issue so far, I think we're pretty close to closure on this. If you nod your head yes, that's good.

(Laughter.)

MR. ELEY: Let the record show that Mark Hydeman nodded his head yes, that we're close to closure.

(Laughter.)

MR. ELEY: All right. Under equipment modeling, there were some recommendations presented at the April 2nd workshop to use different or better performance curves for HVAC equipment.

And these procedures have been developed. They've been vetted. We don't see any problems. We just haven't really gotten around to the nonres ACM yet. So they will be included in the next draft of that nonres ACM.

The only part of the nonres ACM that was developed for this workshop was the appendix NJ on acceptance requirements.

MR. HYDEMAN: There's some measures that were proposed by Southern California Gas under gas

cooling measures; and that was in the August 27th workshop. Largely these cover the ACM manual. There are a few changes. There's a new section 112 requirements because there's a new test standard for gas engine heat pumps and air conditioning units. So those are reflected in section 112, mandatory equipment efficiency tables.

And there's some new proposed rules for gas engine heat pumps and air conditioning units for both residential and nonresidential systems. We're still looking into there's a couple of new curves that they proposed for the absorption chillers, as well. And we're just trying to do some verification with manufacturers of equipment data. But it looks like all those will go through.

Demand control ventilation, this was originally developed by the California Energy Commission and their consultants. It was presented in the April 23rd workshop. And these measures go into section 121, which is a mandatory section. Previously 121, we had provision for demand control ventilation; now it's required on single zone units with economizers, where the

occupant density being served by those units is greater than or equal to 25 persons per thousand square feet.

The next item is the cooling tower measures; actually several measures wrapped together. This was proposed by PG&E and their consultants. It was presented again in the April 23rd workshop.

These are all prescriptive measures, but there are three of them, as I mentioned. One is that there's a requirement where you have cooling towers, and you have multiple chillers and multiple cells of cooling towers that you have to have flow turned down so that you can run multiple cells with less than the same number of chillers. It's an energy efficiency requirement.

There's also a limitation on the application of centrifugal fan towers for those applications that require external static pressure, such as where you have sound traps. And that's because centrifugal fan towers, in general, use about twice as much energy as propeller towers.

And there's a restriction on the application of air-cooled chillers where the

central plant size is 300 tons or greater. And then there's a number of exceptions in there, for instance, where air-cooled chillers are being used as part of a thermal energy storage system.

Hydronic measures, these came largely from ASHRAE standard 90.1, although they were shown to be cost effective in the California life cycle cost methodology. The proponent, again, was the California Energy Commission and their consultants. It was presented in the May 30th workshop.

They're again, a bundled measure; there's five to be dealt with. One is that variable flow is required in both chilled and hot water systems. Meaning that there's now a requirement for two-way valves. Again, this is a prescriptive measure except where you have just a few coils. If you have, I think, three or fewer coils you're not required to have variable flow. And also if you have flow restrictions on the central equipment you can have a number of three-way valves to protect the equipment.

There's a requirement for chiller and boiler isolation where you have multiple pieces of equipment to prevent over-pumping of the system

when it's not necessary. It's really just an isolation valve.

There's temperature reset controls of chilled and hot water systems. These requirements link to variable flow. So if you have a variable flow complying with the variable speed driven or equivalent pumping arrangement, you don't have to have the temperature reset controls.

But on constant flow systems and systems where you have variable flow, but it doesn't meet the variable speed pumping requirements, you are required to have temperature reset, as well, on chilled and hot water systems.

There's variable flow requirements for water loop heat pumps on systems above --I can't remember, Charles -- I think a total connected pump horsepower or ten or --

MR. ELEY: It's ten horsepower.

MR. HYDEMAN: I think it's a ten horsepower threshold. If you have a water source heat pump system you must have basically two-way isolation valves that are linked with the compressor. So when the compressor is off, when the unit is neither heating nor cooling, it draws no condenser water.

And finally, the last requirement is that you have to have variable speed drives or equivalent means of unloading for condenser and chill water systems where the pump horsepower is five horsepower or greater.

Nonresidential duct sealing and insulation. This is new construction. The proponent was PG&E and their consultants; presented in the July 18th workshop.

There are two issues here. One has to do with the insulation and the other has to do with the duct sealing.

And this applies to single zone units that serve, I think, 5000 square foot of space or less. And where the duct is predominately in either unconditioned space or on the roof. And the test of that is that 25 percent of the duct area is either in unconditioned space or on the roof. Then you must meet these requirements.

It sets a minimum insulation level of R8, but, of course, that's tied to the UMC requirements. The UMC requires higher levels of insulation that use UMC tables. And it also requires that you have no less than 6 percent cfm leakage out of the duct work. And that leakage

testing must be certified through field tests. And that follows the residential duct sealing requirements.

This is a relatively controversial measure that is still in development. It deals with the replacement of -- sorry, it deals with duct sealing, but it's triggered by the replacement of air conditioning or heat pump units.

Again, I believe it is just covering single zone units where the duct work is largely in unconditioned or outside spaces. It'll follow probably the language of the previous requirement. But there's been no changes made for this measure since the November draft -- sorry, since the July 18th workshop --

MR. ELEY: This should say 2002 draft.

MR. HYDEMAN: And it's still under consideration and would be, I assume, presented at a later workshop? Yes?

MR. ALCORN: Yes.

MR. ELEY: If it goes in --

MR. HYDEMAN: Nods mean agreement around here. Reasonable agreement.

Okay, next one. ECM motors. John

Hogan, I think, originally brought this issue up. There's a requirement, I believe, in Seattle for variable speed driven motors; in this case, electrically commuted motors for fan coils, particularly series styles boxes.

So these are boxes where the fan runs all the time; anytime the system is on the fan is running, whether it's in cooling or heating. And there's now a new prescriptive requirement for that. It's in section 144(c)(4). And it doesn't just lock in ECM motors; there's a performance requirement so that if somebody comes up with a motor that's similar to the performance ECM motors, or another device, that they can also comply.

VAV size thresholds. This was proposed by the CEC and their consultants; presented in the August 8th workshop. Basically on the existing prescriptive requirement it used to say that if you had fans of 25 horsepower or larger that were variable air volume, you must have a variable speed drive or equivalent level of control. Variable pitch blades, for instance, can meet that control.

The threshold has now dropped to 10

horsepower, given new research. Cost effectiveness.

This measure really has to do with what would be traditionally called constant volume single zone units. And it's proposed by Southern California Edison and their consultants.

They are working on a compliance option for units that have multiple compressors or multiple stages of cooling that basically will give you a credit if you have variable speed on the evaporator fan.

So as you go from 100 percent capacity down to 50 percent capacity, you would step the fan down, as well as the compressors. And it's not been implemented in the current version of the ACM manual or code, but it may be considered at the next workshop.

That's it.

MR. ALCORN: Okay, thank you, Charles and Mark.

MR. HYDEMAN: Bryan, I failed to mention there is also a paper that was out there from Jon Leber that modifies the demand control ventilation requirements.

So, again, if you're interested in the

demand control ventilation requirements, there have been some minor modifications. It's in this two-page letter that was out in the front table.

So, it's similar to what was out there for the performance requirements.

MR. ALCORN: Thank you, Mark. Okay, we're going to open the floor now to receive questions and comments on the proposed revisions.

I have three speaker request cards so far, so if anyone who is planning on making a comment hasn't filled out one of these cards, please do so, and give it to Elaine Hebert, please.

The first person we'd like to hear from is Scott Alexander from Mobile Modular.

MR. ALEXANDER: Thanks for giving me this opportunity to speak. I'm with a portable classroom supplier. We're one of the largest suppliers in the state. We have about 18,000 buildings in our fleet. About a third of those are classrooms. So we have a particular interest in the relocatable classroom section of this.

One of the significant concerns that came out for us in just reviewing it was how plan checkers, on a going forward basis, would view the

language that was in here.

Typically when codes are put into effect everybody understands that the code applies to buildings that are built after the code is implemented. And while that generally seems understood by this document, there's some pretty forceful language in here that I think can be problematic for us. Especially when you consider the nuances of how relocatables are dealt with.

So I'll try to be brief and just share with you what that means.

Relocatables are just that, they're relocated. And we move literally hundreds and hundreds and hundreds of them monthly for districts, both that they own and that we own.

And what essentially happens is that we carry plans down to the State Architect's Office on these relocatable classrooms that are sometimes two, four or five years old. And the architect takes a look at the plans and sees that the buildings were approved once under a previous code; and then reviews all of the site work and everything else that's going to be done under the current code. But does not re-review the building. The building was approved at one time

and it does not need to be re-reviewed as long as it has not been altered.

And so that's a very ordinary process that works very well for districts. The buildings are then relocated constantly.

So I see this new code as being fine. All the new buildings that we build would be built to this new standard.

There's some pretty forceful language in here about the classrooms that cannot lawfully be used in multiple climate zones. And that sort of forceful language, I think, is going to really create some upset with plan checkers. And they're going to see that, and they're going to see the existing portables, and they're going to say, wow, wait a second here, I've got not lawful, cannot lawfully be used. And it's going to create some real problems.

And so I think some adjustment needs to be made to the language so that it's absolutely clear that the literally tens of thousands of relocatables that are out there -- we estimate that there's about 100,000 of them in the state -- they get moved to multiple climate zones aren't going to have a problem.

Because otherwise you will have districts and other organizations such as mine that move classrooms that are going to run into plan checkers that have real problems.

So I think some minor language changes will help. And that's what I'm here really to say.

MR. PENNINGTON: Yeah, just a couple responses. You're absolutely right that these standards have no effect on relocatables that were manufactured prior to when these standards go into effect. And so that's the way building codes work, and you know, these standards don't change that.

Our original proposal related to relocatables was to have a statewide set of measures that would apply regardless of where the relocatable was located. And that was what we thought was a reasonable thing to do and would give certainty to manufacturers about what the requirements are; and they wouldn't have to worry about where the relocatables get moved to.

But when the Energy Commission and the Division of State Architect met with manufacturers of relocatables there were a number of those

manufacturers that urged us to provide the same level of flexibility for climate-specific measures as for site-built nonresidential buildings.

So we were willing to accommodate that idea, but we need to make sure that if a relocatable is built for one particular climate zone, it doesn't get moved to a climate zone where it doesn't comply.

So it seems to me this is which way do you want this, you know. Do you want to have your cake on this side, or do you want to have your cake on this side? I mean either comply with a statewide standard, which is an option. Or we need to have a tracking mechanism that keeps track of where the relocatable is moved to.

And using the idea of the placard that's currently used with relocatables was what we came up with.

MR. ALEXANDER: I actually think that works beautifully.

MR. PENNINGTON: Okay.

MR. ALEXANDER: I think that'll be just fine.

MR. PENNINGTON: So the language was kind of intentionally strong to make it clear what

the obligation was if a manufacturer chose to comply on a climate zone by climate zone basis.

MR. ALEXANDER: And I think that works beautifully. I think it's the nuance that you're dealing with existing buildings that are being moved, as opposed to new buildings.

And oftentimes people don't quite understand that. Because anytime a new building is built you're bringing a new product down with your plans to the State Architect's Office, and everything is new, and everybody just sort of realizes that, and it meets the new code.

But when you bring an existing building down, the State Architect currently understands that, and building officials understand that, you're bringing an existing building down that met an older code, along with your new site drawings.

MR. PENNINGTON: Right.

MR. ALEXANDER: And so they go, okay, that's just fine. And that works. So really strong language like unlawful can be upsetting. And I can just tell you that you'll have plan checkers that will go, well, you just can't use this.

And so I can send somebody along and

explain it to them, but it's much cleaner if what we have is language that says something like buildings manufactured after, or you know, major alterations after, or something like that so that it's --

MR. PENNINGTON: Well, that's what the standards do say.

MR. ALEXANDER: -- really clear. I'm not seeing that --

MR. PENNINGTON: Yeah, we --

MR. ALEXANDER: -- is really clear here.

MR. PENNINGTON: -- we don't say that in every section of the standards, we say it one time in the standards.

MR. ALEXANDER: And I just am not seeing that. So, maybe there's a way to make it clearer, or have it pointed so that people are seeing that as it relates to relocatable classrooms. Because it is a different nuance when you're taking an existing building and going through a new building code process.

MR. PENNINGTON: Okay.

MR. ALEXANDER: So that's the --

MR. PENNINGTON: The other thing I would say, Scott, is that we're working very closely

with the Division of State Architect to communicate effectively on what the standards mean. And we also have our compliance manual that details how the standards need to be complied with. So to get away from the legalese and get into, you know, trying to say this in practical terms and giving examples and that sort of thing.

And we intend to have a special section on relocatables in the compliance manual. So there'll be some more information for DSA that they can have with their plan checkers about how the standards work.

MR. ALEXANDER: Okay. That would be good. And I'd love to spend a little bit of time with you on exactly where that language is, and then see how that's going to be applied, again, to relocatables, as people begin to sort of deal with an existing building going through a new building process.

MR. PENNINGTON: All right. Good, thanks.

MR. ALEXANDER: Thanks for your time.

MR. PENNINGTON: Sure.

MR. ALCORN: Thank you, Scott. Bob Hansen from Williams Scotsman.

MR. HANSEN: Good afternoon; thank you, Bryan. I am also with an industry, like Scott, who has a lease fleet of DSA-approved classrooms released to school districts. Scott may have said this before, but, of course, it's an integral part of districts and their programs for modernization, for enrollment, for the changing demographics in California.

We have about -- the industry has about 15,000 of them that, of course, meet the current codes, the codes at the time they were built, Title 24.

And our concern is -- one of our concerns is what happens to them when they move. We will have to work closely with DSA, as Bill points out, because DSA currently would see an alteration, quote-unquote, as anytime it is moved from one place to another. And that then triggers a different kind of plan review.

What we've been concerned about, from not only our standpoint as a business, having looked at the expense, but also the school districts, is that if DSA sees this as an alteration they take it then through the process and look at upgrading the entire building to the

new code.

We were talking about things like cool roof and perhaps demand controls and insulation, windows, stuff like that, all of which will be expensive and time consuming. So I do think we need to carefully look at existing buildings versus the new buildings.

I can tell you our business and Scott's in it, too, we're all four upgrading these buildings, making them more energy efficient. Anything that dresses up a portable classroom we're for. There's been this tendency to have the entire market go to the low bidder. And so if we can upgrade it it makes our industry better, and we're for that. We just need to look at doing it wisely.

There's about 100,000 DSA portables out there and we don't want to suddenly this summer, when the districts go through the relocation, trigger them having to make all these modifications. They have a hard enough time moving them, much less get through this part. So we'll have to look at that.

The other thing, of course, is OPSC, the Office of Public School Construction, has a fleet

of about 6000 portables that they move all over the state, to the different zones within the state.

Most schools can stay within one zone. You get a district like Fresno and it's going to say within zone 14. They move them around. You get a district like LAUSD, and they're in probably three different zones. And so that will be a consideration, as well.

I think going forward our industry will buy them so that they work in all zones, or possibly everyplace but Lake Tahoe and Palm Springs. So we can work it out.

But I think it's a consideration for school districts. School districts have been hit by one piece of legislation and policy after another. And I can tell you they are highly stressed with the policies they have now. The maintenance people, they're trying to teach students, they get a lot of stuff layered on. You're going to layer on some more, rightly so, but please be conscious of it.

If it is not done mindfully what the districts tend to do is ignore it because they don't have the resources to get to it. So we just

have to think that part through.

Also, Bill, one last thing is we talked earlier. I think the products, themselves, we need to consider their realistic use versus what the manufacturer tells you they're going to use.

I think of the case of LP Innerseal, which was supposed to be the new gift for siting to the construction industry. And, of course, it deteriorated or laminated after about ten years and most of it's been replaced.

Cool roof, I work for a company -- I've been in the business 19 years, work for a company that has 92,000 modular buildings. And we use cool roof products. They are not created equal. You have to be very careful how you apply them. And if they are not applied correctly, they will crack, leak, water will pool underneath them, and this causes a whole host of other problems like dry rot and mold and other things.

So, while it's a good product, that particular one is a good product, we use it, you just have to again be mindful of how you do that. Same thing with the ballasts, be mindful about whether they're really going to last seven years, new products are touted as being panaceas, and

often aren't.

That's all I have. Thank you very much for your time.

MR. ALCORN: Thank you, Bob. With more comments on relocatables, John Hogan.

MR. HOGAN: Thank you. John Hogan, City of Seattle. I wanted to offer a couple of observations and questions. Why aren't these standards being applied to all portables, rather than just being limited to classrooms? That's sort of a general question.

And the context I offer that, the Washington State energy code has applied the energy standards to all buildings, including portable buildings, since it was first adopted in 1980.

And the system, I think, which we're talking about here, having a label on the side of the building, Washington State has that system. You have plaque labels and gold seals, and you got the variety of different things.

Washington State has two climate zones, and all the buildings either comply with climate zone 1, which is less stringent; or if it says it complies with climate zone 2, that's considered to

comply with climate zone 1, because that's the more severe climate.

Though it's I think maybe got some differences here between very hot climates, very cold climates. So maybe there isn't one climate zone you could say everything complied with.

But that system seems to work very well. All the plans examiners. It's not much different than the building code. They know if it's got the seal it's been through some check and so you don't do anything different for energy than you do for other issues.

In terms of alterations, I don't know exactly how the term is defined here, but in terms of energy work, just because you're moving it it's not considered an alteration.

If you have a portable and you're changing the lighting, then we're looking for the new lighting, you know, we review that during the energy plan review, and we expect that will comply with the new code. So it may have been built in 1995, complied with the lighting in effect at that time, but they're changing the lighting now. So, of course, they bring it up.

So there isn't a total grandfathering

that it was built once and then it's never subject to the energy code ever again. It's -- following through on things.

MR. PENNINGTON: If there's construction site changes to the building that are alterations, then the alterations that apply for other nonresidential buildings would apply. Our lighting requirements, I don't think, are exactly the same as yours, related to alterations.

But, you know, if you what, -- Mazi, I'm trying to remember this -- if it's more than 50 percent of the ballast --

MR. SHIRAKH: Mazi Shirakh, --

MR. PENNINGTON: Of the luminaires.

MR. SHIRAKH: -- CEC. You either have to change more than 50, replace more than 50 percent of the luminaires. Or add to the lighting.

MR. HOGAN: That's the way, in Washington State the threshold is 60 percent. So if it's less than 60 percent you can maintain or reduce the wattage. If it's more than 60 percent you have to comply.

This issue perhaps comes up a little bit more because it applies to all portables. So if

you have something that you're using as a classroom and you decide to use it as an office, and you're changing, you know, you could run into some issues there with changing the use, also. So that might trigger some different things.

MR. PENNINGTON: Related to your comment about moving a portable, it's not an alteration, that's true. And so really the only thing that's being permitted at that time, in general, is the site work to reinstall the portable.

But in this case we want to have on the placards a way of tracking whether or not the movement is occurring into climate zones that those relocatables have been designed to be built for.

So, that's the only check that happens at the time that it's being moved.

MR. HOGAN: And we have that tracking information, also. Is there a reason why this is limited only to classrooms? And why this doesn't apply to all portables?

MR. PENNINGTON: That was how it was originally proposed back when we had time to evaluate the consequences of the proposal. So, --

MR. HOGAN: Okay. I think I heard an

earlier speaker say that maybe a third of their stock was classrooms; and that's two-thirds that were not classrooms. So I would say there's a good potential out there, and I'm not sure I see why there should be any different application for classrooms than other portables.

MR. HANSEN: To answer your question as to why aren't the rest of the portables under this new energy code, it's a matter of division of responsibility. We're talking about buildings that come under Title 24, which is the PSA. The other buildings which come under the California building code are under Housing and Community Development.

Currently we're in the process of changing the way the law reads -- there's this little snafu in the law -- so that we can keep pace with the current California building code. The snafu in the law is historical; it comes from when commercial coaches were called mobile homes, and then got swept up in the HCD.

So, at that point in time, once it becomes under -- once we are paralleling the California building code, the new energy code will be adopted. So everything will then be in step

and in lock.

It's something we don't like, either. The industry is working with old codes, and it's just making us look bad. So we're working on getting there.

MR. STONE: Can I ask a clarification of the clarification?

MR. HANSEN: Yes.

MR. STONE: So are you saying that the two-thirds that are not classrooms are all residential? You're not talking about any portable office buildings?

MR. HANSEN: No, we don't do it -- our industry doesn't do anything residential. It's all commercial.

MR. STONE: And the HUD standards govern those non-classroom commercial relocatables?

MR. HANSEN: I couldn't give you an authoritative answer on that. I've only been in and licensed to deal with commercial coaches, they're now calling commercial modulars.

MR. ALCORN: Thank you, Bob and John, for your questions. We really appreciate the industry coming to the workshop and communicating with us. Thank you.

Okay, we have one final comment on modular, from Martyn Dodd.

MR. DODD: Section 141 talks about the analysis of the relocatable classrooms, and determine its space conditioning budget and -- orientations, and in increments of 30 degrees. So we're basically looking at 12 different runs to determine the energy consumption.

Might I suggest for simplification purposes that we follow something similar to what we do with the production housing, which is just do the four orientations. It's going to simplify the analysis. It's going to be consistent in terms of the way we do the two different types of buildings.

And it's certainly going to cut down on the amount of paper work that's going to be needed there. And I don't think we're going to sacrifice a lot in terms of accuracy.

MR. ALCORN: Thank you, Martyn. Is there a response to Martyn's concern? Gary.

MR. FARBER: I have one thing in that regard. As long as we're going to do the multiple orientation, why don't we just extend that to the nonresidential, because once in awhile we'll see

nonresidential buildings with multiple orientations, identical buildings.

And if we could just simply do one compliance report, you know. I mean perhaps you'll decide four is enough. If not, maybe it takes eight. I'm not sure, 12 may be overkill.

But whatever we decide on, let's do it for nonresidential as well as portable.

MR. MAEDA: Bruce Maeda. I wanted to make a comment to the commenters here. If we do multiple orientation I don't think it should be -- orientation; I think we should shift that to, you know, I don't care if it's four, but it should be off-axis at least 45 degrees, and perhaps even some other oddball orientation. You could do four; four is probably enough, but you have to make it sufficiently off-axis that the effects of overhangs and things like that are taken into account.

MR. ALCORN: Thank you. Are there any final comments on portable classrooms?

Okay, hearing none, let's shift over to another issue. And that would be demand control ventilation. We have three commenters. Deborah Gold from CalOSHA. Is Deborah in the audience?

Thank you.

MS. GOLD: First, I'd like to thank you all for helping us out, trying to figure this out. All three spent some time with us on a phone call. And Bob and I are going to ask some questions, I guess, together.

And our concerns are that we have been approached by a number of people who are in schools who are concerned about what they perceive as a current under-ventilation of classrooms as an indoor air quality issue. And it's caused a lot of compliance activity for our people.

And so we're concerned about the extension of demand control ventilation to classrooms because of that. And so we have a number of questions between Bob and me.

And one of the questions is whether -- it's our understanding that a zone can be more than one room; is that not true in this standard? It is true, it isn't true?

MR. PENNINGTON: It is true, yes.

MR. ALCORN: It's true.

MS. GOLD: So then is there a carbon dioxide sensor required to be placed in each room?

MR. HYDEMAN: No, but could I just

stress your first concern about classrooms. Typically classrooms, unless you're in a university where you have a lecture hall of hundreds of students, they wouldn't be large enough systems to trigger the requirement for an air side economizer.

And if you're not a single zone system with an air side economizer, there is no requirement for demand control ventilation.

So my answer to your first concern is that this requirement, as is presently written, will generally not be applicable to individual classrooms.

MR. ELEY: If they have --

MR. DODD: Mark, I got a comment on that one. It is very very common to use packaged rooftops, five tons, thereabouts, on classrooms. And up till now we've, as an industry, encouraged them to go to economizers to save energy.

So, it's a very common application to economizers. And that specific system is going to trigger the CO2 sensor now.

MS. GOLD: And there are a lot of systems where, a lot of school systems where they have small buildings, five classrooms in a row or

something like that, six of those buildings comprising a school. Or various configurations, there are a lot of configurations of schools out there.

And a lot of them have economizers in the package units on the roof. That is a true thing. So we're concerned because this is a big source of business for us, and we don't actually want to increase our business --

(Laughter.)

MS. GOLD: -- in this regards. I mean it's a concern to me if you have classrooms and they're all one zone in that building, and you only have one CO2 sensor that's indicating the occupancy of that one room, how it is you're going to pick up the activity in the other classrooms.

MR. HYDEMAN: Again, the way this requirement was drafted was that it only applied to single zone systems. And if you have multiple classrooms ganged off of a single zone system, you're going to have temperature control problems in addition to ventilation problems.

MS. GOLD: We do have those.

(Laughter.)

MR. HYDEMAN: This is the rules of

unintended consequences. What you have is something that really should, by all means, be a multiple classrooms with independent schedules. They should have separate sub-zones, if you will, in which case there'll be a multiple zone system.

And from a CO2 or demand control ventilation, if you're serving multiple zones with variable occupancy, the only way to do that is to have a CO2 sensor in each one of the zones.

MS. GOLD: But given that it's been my experience, and I'm certainly no expert on ventilation, but I have spent quite a bit of time as a field inspector for CalOSHA, that we have a number of rooms that are all included in one zone, and they're all going off of one thermostat. And they say, oh, yeah, the thermostat is in Mrs. Jones' room, that's why we're always cold, because Mrs. Jones, you know, whatever.

So if we put the CO2 sensor in Mrs. Jones' room, then, as this is written as I understand it, there's nothing to stop that from happening. That Mrs. Jones has the thermostat and the CO2 sensor, and when her classroom is full there's lots of ventilation for everybody. When her classroom is empty there's not much

ventilation for everybody. Or there's less ventilation for everybody.

So, I guess I would urge you to think about that, and maybe talk to us a little bit about that, because it's -- we get a lot of work from the schools.

MR. HYDEMAN: Can I just ask you a question? If we were to require a separate CO2 sensor for each zone served by the system that had this design occupancy, met the criteria of 25 people per thousand square foot, would that alleviate or erase your concerns?

MS. GOLD: Well, I would then have a question about that because then what's going to happen? Let's say, I mean it is totally typical that you have three out of five classrooms off that system occupied at the same time, and two that aren't. So I don't understand, are we going to now over-ventilate, as you would call it, those two empty classrooms? Or are we going to under -- I mean I think it's a more complicated problem than that. Because what's your CO2 sensor going to cause it to do?

MR. PENNINGTON: Well, you said in each zone. If there's actually multiple rooms in --

(Parties speaking simultaneously.)

MR. HYDEMAN: -- each room that's served by a single sensor --

MS. GOLD: Right, in each room, right, but that's --

MR. HYDEMAN: But to address your issue, what happens when you have demand control ventilation on a multiple zone system, in this case on a single zone system with multiple rooms, --

MS. GOLD: Right.

MR. HYDEMAN: -- is that you would take the highest demand; in other words, the zone that had the highest CO2 level, and you would control to it.

So if one room is over-crowded and the other rooms were empty, you would, in fact, provide enough ventilation so that overcrowded classroom had essentially 15 cfm per person.

And again, I ask you, if we were to make that adjustment would that alleviate your concerns?

MS. GOLD: To me, right now that sounds like it's an improvement over this other. It would take care of this one issue of the many

different rooms having different occupancies at different times. Yeah, that would be helpful.

But I don't exactly understand how you're going to write it, but I wish you luck. I think --

(Laughter.)

MR. HYDEMAN: I would be glad to -- I mean, get my card, I'll give you my number and we can talk about this offline.

MS. GOLD: Okay, great.

MR. ALCORN: Thank you, Deborah. Can we also hear from Robert Nakamura on demand control ventilation.

MR. NAKAMURA: Right. I think you've dealt with one of the questions I had, but another is --

MR. ALCORN: Who are you with, sir?

MR. NAKAMURA: Oh, I'm sorry, I'm with CalOSHA, also.

So just for another point of clarification, these control systems wouldn't be triggered by time, would it? Like according to a class schedule.

MR. HYDEMAN: Every system is required to have a time clock that basically has the quote-

unquote, normally occupied times. And during that time the minimum ventilation on the system would be active.

So, when the time clock kicks on then the minimum ventilation system kicks on and you would have the CO2 sensors actively resetting that minimum.

MR. NAKAMURA: And do you have any data about how long it would take for the system to bring the carbon dioxide level to an acceptable level after it's been turned off for the empty condition?

MR. HYDEMAN: Well, every room and system has its own, if you will, time constant, because it has to do with the speed of the air, the cfm, the amount of air that's being moved in and kind of the volume of the space.

And I believe -- and the ventilation, right. But I believe that calculation has been done as part of the ASHRAE standard 62. I think it was appendix Z. And I can certainly, if you're interested, search around and see if there's a calculation like that that's readily available.

My recollection is that we're talking on the order of five to 15 minutes to getting to a 95

percent level, as opposed to multiples of hours. And I think it's on the order of minutes.

But, again, I'm sure I can unearth those calculations for you.

MR. NAKAMURA: Okay, and then that's to the 1100 or so level of CO2?

MR. HYDEMAN: Well, whatever the setpoint is at. If you look at the present requirement that's in this document here, there's actually a calculation you make that will equate parts per million to the activity level, the -- level of the occupants and the CO2 level in the room.

But, the revised requirement is nominally 15 cfm per person for --

MR. ELEY: I just did a quick calculation. Basically if you have a typical sized classroom, 1000 square feet, let's say; and 400 cubic feet per minute of outside air ventilation rate; you would completely replace all the air every 22 minutes. Three air changes an hour.

MR. HYDEMAN: That's right, three to six air changes is pretty typical.

MS. GOLD: Can I just a question about,

so once it goes down is the 1100 -- we know the 1100 is an upper limit that turns on the increased ventilation rate. But then when it goes down below does it automatically then trigger the lower ventilation rate? Or is there -- do we have a two-point system? Do you understand my question?

Okay, so we've reached the 1100 or 1175 because our sensor was calibrated low. And so we reached the 1175 and the system comes on more. Opens the louvers or however it come on more.

And then now we're below 1100. Does it automatically go to the lower rate, or does it have some other lower setpoint where it triggers, where it goes down? Does it stay operating at the higher rate for some set period of time?

MR. HYDEMAN: There are basically two minimums. The highest minimum is set by the section 121(b) requirements of 15 cfm per person times the anticipated number of people in the classroom. So that's the high minimum.

The low minimum is set by table, used to be 1D, but I think you changed it to 121A, if I remember, which are the building -- it's basically .15 cfm per square foot.

And what the CO2 sensor does, or the

multiple CO2 sensors, the worst case CO2 sensor, will reset the damper between those two points to satisfy the setpoint of 1100 parts per million.

MS. GOLD: Right, so that my question is so that's the only sensor in the system -- that's the only trigger point in the system, so it both comes on at 1100 and shuts off at 1100?

MR. HYDEMAN: No. It actually, the dampers actually open and close between that bottom minimum and the top minimum, as required, to setpoint.

There's a little bit of latency in the controls. In other words, it takes awhile for the controls to catch up with the setpoint changing.

MS. GOLD: Okay, so there's only one setpoint in the system and that's the 1100?

MR. HYDEMAN: 1100, correct.

MS. GOLD: I think that was our question. It was to understand, okay, so then when it senses it's below the 1100, it's going to go ahead and go down to that lower ventilation rate?

MR. HYDEMAN: It will continue to close, and stop at that lower. Never go lower than that.

MS. GOLD: Right.

MR. HYDEMAN: And then the other thing to realize is if the sensor fails, as the requirement's presently written, the system will immediately go to the higher of the two limits. So failsafe.

MR. GABEL: Quick question. So you're saying the damper is variable, but the damper will, in fact, stop at midpoint? Or will always go all the way up and all the way down in response to the sensor?

MR. HYDEMAN: It will stop at midpoint if it satisfies the setpoint.

MR. GABEL: Okay, so it's variable and it will move to just barely meet the requirements.

MS. GOLD: It'll stop at midpoint because it's at 1100?

MR. HYDEMAN: Correct. It reaches 1100 and it stays there, it won't move.

MS. GOLD: Okay, so it stays at that point until it detects it had gone down to 1050?

MR. HYDEMAN: And then it starts to close a little bit.

MR. GABEL: Right.

MS. GOLD: So it's going to continually close more until it gets down to -- until we start

to come up to 1100 again.

MR. HYDEMAN: It basically will go anyplace in between --

MR. ELEY: It will try to maintain 1100.

MR. GABEL: It's dynamically trying to maintain the minimum.

MR. HYDEMAN: In between those two set points.

MR. ELEY: Just like a thermostat is trying to maintain a certain temperature, this tries to maintain the concentration.

MR. HYDEMAN: And this control, by the way, is recognized by the ASHRAE standard 62 Committee, which is the standard care for ventilation.

MS. GOLD: Right, then, I mean our concern is that when we get into classrooms, which are a very sensitive occupancy for us, for our agency, because we get calls from parents and older children and teachers and school employees. So when we start looking at changes to ventilation systems in schools that is a big deal for us.

MR. ELEY: We understand. It's a big deal for us, too.

MR. ALCORN: Thank you. Tom Trimberger.

MR. TRIMBERGER: I'm just a little concerned on the language. HVAC single zone system, and it says, the service base with the design occupancy density greater than equal to 25 people, could be concentrated use and it references some places in the building code, a commonly used table.

It is common for one package unit to serve, you know, a bank of offices and a break room; or a bank of offices and a waiting room. So, one part of that space handled by that unit meets this criteria. So does that mean if any part of that space, and you might have a, you know, 400 square foot waiting room, and then 4000 square feet of office space. Does that trigger the requirement for demand control ventilation?

MR. HYDEMAN: The intention was no, it would not. It would be where a unit primarily serves, meaning the majority of its cfm is serving a high density space. It would be the opposite, you know, if you had a gymnasium and you took one diffuser off to serve an office in the corner. That was the way that we crafted this.

Again, I think we can use the nonres manual to expand upon that, but if you have

particular verbiage you think would be clearer, be glad to look at it.

MR. TRIMBERGER: I don't know if primarily would help or not. I thought that was the intent, but that's not -- word for word that's not what it says. Just a little concern.

MR. ALCORN: Okay, let's move to the next commenter. Elizabeth Katz, California Department of Health.

MS. KATZ: Hi.

MR. ALCORN: Hi, Elizabeth.

MS. KATZ: Thanks for bearing with me if I -- I'm a little new to this side of the world. My perspective is employee health protection. I'm in a part of health services, the occupational health branch that receives inquiries and we're not an enforcement agency, as my associates at CalOSHA are, but we do research and consultation on matters of occupational health.

And I get a lot of the calls relating to mold and other indoor air quality problems. Schools is one of our big sources of business, also.

So there's some overlap here. Teachers and school employees, in general, have poor

control over the HVAC systems where they work. They're not like homeowners. They have to go through layers. And so, you know, of communication and responsiveness and budgetary constraints in order to have their concerns addressed.

And so we're concerned that their ventilation rates aren't being cut back in worst case situations where there will be difficulty for them to get it corrected.

One kind of technical question I have is the requirement for the CO2 monitor to be placed basically anywhere in the room up to six feet off the floor. I think it ought to be placed -- shouldn't it ought to be placed far from the air supply in order to allow mixing? Mixing is a very big factor in a room with low occupancy. In other words, poor mixing will occur.

And if there's a placement of the monitor, let's say, underneath a air supply register, as we have kind of low ones in this room, you could actually have -- it might never measure the ambient or average exhalate, you know, or room CO2. It might only get what's coming in. So the system wouldn't work.

So, is that something anyone's thought about yet or --

MR. HYDEMAN: You're talking about good practice here. And, again, if there was a way to word this carefully where we weren't being ambiguous, but were able to clearly state what the issue is, I'd be glad to entertain that.

I will tell you that, in fact, if you have a side wall supply, probably the best place to put the CO2 device would be directly under it, because you'd be entraining air. It'll get the air from the room that's mixed going up towards that supply.

Whereas if you have something on the ceiling like this, which has some diffusion down along the wall, that would be the worst place. So we need to be very careful about how we word that.

Some of this really has to do with good practices. It gets back to the issue of one single zone system serving what are essentially five zones or multiple zones. That's not good practice.

And we always walk a fine line between trying to mandate good practice and suggest good practice. Mandate comes in the standard; the

suggestions come in the nonres manual.

But I agree with you that it's better to have it in an area that's mixed. But almost all overhead supply systems are relatively well mixed. But you will be biased, the sensor will be biased if it's getting hit directly by the supply air.

MR. PENNINGTON: Question, Mark. Do you know if the manufacturers' specs usually address the location of the sensor relative to this issue?

MR. HYDEMAN: We can check the manufacturers --

MR. PENNINGTON: I would expect that once we develop acceptance requirements for this, getting installation according to manufacturer's specifications would be part of that. So if it's addressed by the manufacturers' specifications, maybe that mitigates the issue somewhat.

MS. KATZ: The manufacturer may specify the installation location?

MR. PENNINGTON: Location. Yes.

MS. KATZ: Okay.

MR. HYDEMAN: And, again, as Bill's pointing out, this can be part of the acceptance requirements.

MR. PENNINGTON: Right, that's what I

was thinking.

MS. KATZ: Another Murphy's Law kind of thing that I'm concerned about is the lag times that may be possible. Let's say you have a room that is designed for high occupancy, let's say, with a number of students, but there are certain days or weeks or periods that the teacher is working there alone, doing -- grading papers, preparing for classes to begin at the beginning of the semester, that kind of thing.

It may be hours, how long before the setpoint is reached, while you're at minimum ventilation. Is that -- I mean, we don't know how long it's going to take one person to generate enough CO2 to get the higher ventilation.

So meanwhile we're relying on the lower amount of ventilation based on the .15 per square foot of occupancy, is that right?

MR. HYDEMAN: If the room is well mixed, which it may or may not be, but if it has an overhead supply typically it is well mixed, you will have -- and someone is in there over a period of time, it will reach a steady state. And that steady state will represent that person's off-gassing as long as they don't stand up every five

minutes and do jumping jacks.

But if they're sitting there doing some level of activity in the room, they'll reach a steady state. And the system will also reach a steady state.

MS. KATZ: But what will that state be? Will it be at 1100 you're saying?

MR. HYDEMAN: It will be at whatever the setpoint is. If they left the setpoint at 1100 parts per million, it will be at 1100 parts per million.

The only time that the constants of the amount of ventilation air coming into the room, room air flow, and the change in occupancy will come into play is where either a group of people leave the room, in which case it will be over-ventilated for a short period of time, or a group of people come into the room, in which case it will take a little bit of time for the system to catch up.

But, again, it's on the order of minutes and not on the order of hours.

MS. KATZ: Okay, do we have field -- is there field data for that? Because I'm just concerned about simulations that don't take --

MR. HYDEMAN: I'm sure that there is field data on the performance of CO2 sensors. I'm, in fact, involved in a project right now; we're working on the Sacramento Federal Courthouse where we're collecting field data on the hearing rooms. Going up to commission the system tomorrow.

But I'm sure there's also field data that's been presented to the Standards 62 Committee. And we could request that from the manufacturers if it's of interest to you.

But again it's --

MS. KATZ: -- helpful -- well, we can talk --

MR. HYDEMAN: -- it's the sort of thing that's relatively easy to calculate.

MS. KATZ: Okay. And one other thing. Do we know whether the minimum ventilation rate -- you're going to have a lower average minimum ventilation -- I'm sorry, a lower average ventilation rate, that's the whole point, right? Would there be any effect, or has anyone considered the effect on relative humidity or air exchange that might relate to the development of mold growth?

MR. HYDEMAN: Well, typically the control of relative humidity is really a function of the loading and the sizing of the air conditioning unit. So, it's somewhat dynamic because it depends on what the load is for the unit.

I'm not an expert on mold growth. I can't tell you that I know what promotes, aside from dark, dank places with no air movement --

MS. KATZ: Well, relative humidity becomes important especially in cold spots.

MR. HYDEMAN: Sure. Again, I'm not an expert in that area, but there are experts on the Standards 62 Committee who looked at and approved the use of demand control ventilation. And I do like to defer to those people that included industrial biologists and others and industrial hygienists and others that really have looked at some real data.

But, I don't know offhand. I do know that the Standards 62 Committee has looked at a lot of health data produced by OSHA and others in laboratories across the country and concluded that demand control ventilation did not create more problems, provided that the setpoints were

reasonably set and the sensors maintained the calibration.

MS. KATZ: I would like to just make a distinction between making the calculations and making the lab studies versus the field studies. And I think it would be very reassuring to know that in field studies with all of the, you know, whatever else is -- whatever other sources of moisture or odors or off-gassing from furniture are going to occur, that the .15 is sufficient for those, the .15 per square foot and so on.

But those -- I hadn't been familiar with those before, and so I'm going to want to see what they were developed from. And perhaps that's not a place for this in this meeting.

Okay, thank you very much.

MR. ALCORN: Thank you, Elizabeth. Are there any more comments on demand control ventilation? Deborah Gold.

MS. GOLD: The other concern I have about demand control ventilation in the schools is that we're triggering off of carbon dioxide which is good for occupant generated contaminants. I mean they're just -- from people's being in their bodies.

But we have other sources of contaminants in classrooms other than the furnishings that Liz talked about. You know, we have a situation where the crew has come from the district in order to remodel the classroom next to yours. And so they're in there painting and things. And we're relying on ventilation to make your room inhabitable. Where science teachers come in and do experiments and fill the room with noxious odors, none of which are going to trigger the CO2 sensor.

So there's a concern about maintaining general dilution ventilation because of what goes on in schools that doesn't have to do with occupancy. And what Liz said about the teachers and other school employees typically have very little control over their ventilation system.

I don't know if there's a requirement that there be a manual override for the DCV sensor. I know there's a requirement for there to be a fail-safe, you know, fail in the large, in the higher ventilation -- but typically not the principal -- there's isn't typically a building engineer in the school. There is typically a building engineer somewhere in the central school

district.

And what there is in the school is the custodian who doesn't know anything about the ventilation system; the principal who doesn't know anything about the ventilation system; the teachers who don't know anything about the ventilation system; the paraprofessionals who don't know anything about the ventilation system; the clerical employees who don't know anything about the ventilation system; and the students, some of whom may know something about the ventilation system.

(Laughter.)

MS. GOLD: And so, if you're going to move this thing into schools, I think there at least needs to be some kind of a way to manually override it when there are other sources of contaminants that require ventilation that are not people.

MR. SPEAKER: Hire the students.

MS. GOLD: Yeah, there you go, in full employment. Thank you.

MR. ALCORN: Okay, it looks like we've heard all the comments on demand control ventilation. I would like to move on to several

speakers now that are going to be talking on a variety of topics.

We'll start with Martyn Dodd on fan horsepower thresholds.

MR. DODD: Okay, so section 144 --

MR. GABEL: Martyn, what page is that of the new standard --

MR. DODD: Page 103.

MR. GABEL: 103.

MR. DODD: Okay, so we've now got the variable speed drives knocked down from 25 horsepower to 10, which is great; that's where they need to be.

Might I suggest we also take this opportunity to regulate the power consumption of fans, and take the power consumption of fans number from 25 down to 10. So, in other words, right now any fan motors that are between the zero and 25 horsepower, there's no regulation on how much fan power.

So I'd suggest either we take it down to 10 horsepower or maybe even consider taking the threshold off all together, just regulate all fans. There's no reason why we couldn't do that.

MR. HYDEMAN: Well, it was not something

that we had the resources to study. I will tell you frankly, as you know well from having done all of these runs on compliance, that the existing fan power limits of horsepower per cfm, a little bit nettlesome.

You can only truly cut the top end of worst practices off, but you can't really limit the fan power in small systems. It's a package unit. You're typically -- your economics will dictate, you'll try and get the most air out of it as you can. Otherwise you have to buy a bigger unit. So, most contractors will try and, you know, sensibly size the duct work so they're not constraining it.

But with built-up systems you're dealing with everything from central systems on large high rise buildings to floor-by-floor, and the static pressure per cfm is quite different on those. I mean you go from six inches on one end to two inches on the other. And it's very hard to come up with a good limit.

I sat on the 90.1 Committee while we struggled with that for months. And I missed that round of Title 24. But I think it would be hard to set up a justification, and I don't think it

would be prudent to just drop those limits without having spent some time studying it.

MR. DODD: Well, the numbers that are in here right now, the .8 and the 1.25, extremely generous numbers. I remember when Steve Taylor developed those. He said there isn't a system in the world that's not going to meet these. And that's, for the most part, true. The only ones that don't meet it are the really horrible systems.

So, I mean it's already a very generous number. All I'm suggesting is regulate it down to the 10 horsepower range or something like that.

MR. HYDEMAN: I guess my reaction to that is let's say we remove that limit tomorrow. It would add to the paperwork for compliance on small systems, but I don't think it would ever mandate a change in a system. In other words, I don't think it would change anybody's behavior, because on those smaller systems they typically would meet the horsepower for cfm requirements, anyway.

MR. DODD: I agree, but it's not going to add to the paperwork and we already do them at 4 on the small systems. And it's already on the,

you already got that on the bottom of the -- 4. So really, there's no additional paperwork; it's just a matter of saying, hey, new limit is 10 instead of 25.

MR. GABEL: Could I ask a quick question? Are we talking about nominal or are we talking about brake horsepower design conditions, by the way, for this -- for all of these?

MR. HYDEMAN: This is fan system horsepower, Mike, so this --

MR. GABEL: Is it nominal?

MR. HYDEMAN: -- this includes the exhaust fans in the zone, the series fan powered boxes, the return fans, and I believe it's all brake horsepower.

This is one that I'd like to, if we could, discuss offline, see if we can't come up with -- I just think there's a lot of issues here and I'm certainly open to the idea, if the Commission is, but again, you know, within the limited resources, I don't think there's a lot of bang for the buck here.

The bigger one would be if some day we could figure a way of categorizing systems so instead of just having two numbers, we had a range

of numbers. And we limited each one to kind of best practices. But that's eluded me for a long time.

MR. DODD: I agree, top and bottom, yeah.

One other thing that's not on my blue card, Charles, on pages 87 and 88, I know you guys made a conscious effort not to touch these tables, but --

MR. ELEY: Standards or the ACM?

MR. DODD: Standards. What used to be table 1-H, 1-I, the U factors for the wood frame walls have absolutely no correlation to any of the standard CEC default U factors that are published in the appendices of the manuals.

The residential U factors that we use in the residential ACM model and all of that good stuff, those, in the last round, were coordinated so that we use the standard CEC U factor, which I believe for an R-13 wall is .088.

But that never happened on these nonresidential values. So I'm wondering if you guys would consider making those consistent with the U factors for the default walls. And I realize that the U factors from the default walls

are probably going to change, because we're talking about this 15 percent -- sorry, 25 percent framing and all that good stuff.

So when you make that change I'm presuming that that table's going to change. So, maybe you could coordinate that so we have the same numbers.

MR. ELEY: Yeah, I don't think these numbers -- these U factor -- 1992.

MR. DODD: No, they haven't. They've been wrong since --

MR. ELEY: So, it would probably change the calculations in the process, right?

MR. DODD: Well, we're just talking about a small amount of difference. But the problem is if you put in an R-13 wall, if you use a CEC default, it's .088.

Okay, but if you go to this table it's .084. So that's where the real disconnect occurs. And that actually occurred with Jon McHugh's project, remember the one you were working on? Same problem there. A building that complied prescriptively, put it in, you use those default values, it doesn't comply. It's because of the U factors.

That's all.

MR. ELEY: -- sure to look at that, yeah.

MR. ALCORN: Okay, thank you, Martyn. Mike Gabel, comments on service hot water.

MR. GABEL: Yeah, just a quick follow up on this previous topic. The glossary doesn't include fan power index. I think it did at one time, I'm not sure. I don't see it at least defined in the glossary.

It would be useful to emphasize the brake horsepower under design conditions or whatever the intention is, just so that we're all clear.

MR. ELEY: You're talking about which glossary? You mean the definitions?

MR. GABEL: Definitions, I'm sorry. The definitions in the standards. Maybe it's elsewhere, but even if it is elsewhere I think the definitions is probably a better area to have something which is used commonly throughout the language of the standards, just so it's in one place. Just a suggestion.

MR. ELEY: There's actually several glossaries right now. We're going to try and

consolidate them as best we can.

MR. GABEL: Oh, okay.

MR. ELEY: There's a glossary in the nonres ACM, there's a glossary in the res conservation manual --

MR. GABEL: Okay, so you're going to revisit --

MR. ELEY: -- manual and -- The definitions are mostly consistent, but --

MR. GABEL: Well, while I'm on definitions I'll throw out another one, too. TDV energy is fine the way it's written. It would be good to reference section 102, which is a few pages later, which explains the calculation of TDV energy just because it's, you know, clearer where you find the more information about this.

Very briefly, I want to address service water heating. Since '93, I think, at least, if I put in an electric resistance service water heater in my office building or in my restaurant or in my hotel/motel guest rooms, the service hot water in the standard design is also electric resistance heating.

And I thought the CEC was going to fix this one, and I guess it slipped through the

cracks, I'm not sure if it's too late to address this.

It doesn't really require a huge study, it's just kind of a no-brainer whether the Commission feels as if gas source domestic hot water heater and service water heating is a reasonable standard design assumption. And it might be a performance versus prescriptive thing, I don't know. I'm not sure about the NAECA standards, whether prescriptive you're allowed to require it, but the performance method you might want to consider.

And it doesn't matter much in office buildings since it's a low number. But in restaurants and hotel/motel, it adds up. So just as a point of order to see if it's not too late to look at that briefly.

I've got two other brief comments. Bryan, should I make them now and be done with it?

MR. ALCORN: Yes.

MR. GABEL: Okay. Gary Farber and I've been talking about some of these. Manufactured windows versus -- or factory-assembled versus site-assembled fenestration in commercial buildings.

If it's site-assembled, you're allowed to use an algorithm for the SHGC. And if it's manufactured as of October 1st, a month ago, you can't.

The problem is the standards nor the manual clearly define the distinction between the two in a practical term that helps the building official know -- how does a plan checker know from a elevation whether that elevation -- those windows are going to be premanufactured or site-assembled? I mean there's no firm way of knowing that.

So there's a -- I'm not sure I have the answer -- but there's a question there about how you clarify that for both the permit applicant and the plan reviewer, and then finally the field inspector is in another situation.

So I wanted to just draw that to your attention to see if there's something that can be done to clarify that issue in the standard.

Another one which is a small bugaboo, but it affects builders and consultants like us, is the standards conclude a distinction between skylights which are glass skylights, glass with a curve, without a curve, and plastic.

And the problem with that distinction, although it's an ASHRAE 90.1, is that people designing buildings often don't know what it's going to be. And then if the consultant or the applicant puts the wrong value in there, default value, and then it changes, in theory the building department could make them redo the whole thing for that.

I think the CABEC position would be we would like to see the most conservative, i.e., the highest U factor, highest SHGC for skylights be placed in the prescriptive requirement to cover all different skylight configurations. And then that number would be used in the performance method, as well.

And, well, that would just make things a lot easier. I'm not sure if you guys have done a study to determine whether that distinction is really significant in terms of the standard in terms of some other things. But again, we'd like you to revisit it if it's not too much trouble; take a look at it and see if that's something that can be simplified.

MR. PENNINGTON: Can't you choose to do that already? Can't you choose, as an energy

consultant, I don't know what kind of skylight's going to go in here, so I need --

MR. GABEL: Yeah, but -- well, it depends on the building official. I mean basically if we make a conservative assumption, sometimes building officials who are eager and don't know the meaning of the distinction might simply say, you used this value, and you know, it's for glass. We want to see the one -- it's a plastic skylight, re-do it, or something.

There's a ceratin level of fussiness about this which I'm not sure is going to make much difference in the outcome, but --

MR. DODD: Mike, you know what would solve the problem? Just have a category quote unknown. No, seriously. We have a category with the walls --

MR. GABEL: Well, then it should be just a --

MR. ELEY: Well, it should be the one without curves.

MR. GABEL: It's the glass -- is it the glass, I think --

MR. DODD: Yeah, then the unknown would be the -- you meant to say lowest SHGC, I think,

earlier?

MR. GABEL: I'm sorry, yeah, the standard would require the lowest.

MR. DODD: Right, so have a category that's unknown. It's the lowest SHGC, lowest U factor.

MR. GABEL: That's fair enough. Maybe it's semantics, but it just would make things easier.

MR. PENNINGTON: The lowest -- I'm not following you.

MR. GABEL: Well, it's a question of what values you use in the -- to set the energy budget. You want to use the lowest values for U factor SHGC --

MR. PENNINGTON: So that would make the most stringent standard --

MR. GABEL: That's right. That's right, which is fine with us.

MR. PENNINGTON: So that means that a whole bunch of skylights that you install out there are not allowed actually.

MR. GABEL: Well, not on an overall -- no, in fact, --

(Parties speaking simultaneously.)

MR. PENNINGTON: I don't see how it solves your problem is my point.

MR. GABEL: That's for the prescriptive performance, all I'm saying is that you want to take off the table this question of what it is and who knows what it is and what it's going to be when it gets installed. I just think it's a lot of much ado about nothing.

MR. ALCORN: Nehemiah.

MR. STONE: A couple questions about that, Michael. The first question would be do you not care that that would take away some of the incentive for people to choose and put in better product?

And then the second question would be since the performance values for fenestration, and including skylights, don't always mean that one direction is better. How do you decide what's the right thing to just say well, here's the value you're going to get.

MR. GABEL: This is the same thing with variable fenestration; it's the same.

MR. STONE: Exactly. And that's not --

MR. GABEL: Right, right, but we don't -- I don't think they put the standards, if someone

has metal vertical windows they use one value; and if they have vinyl vertical windows they have another. And if they've got wood they use a third. And if they have something -- I mean we don't do that with vertical glazing, so --

MR. STONE: Because they're labeled.

MR. GABEL: Some of them are and some of them still aren't. And that's a whole other debate.

But I also thought that skylights -- well, if that's the case, then, even I would say that's a better argument for what I'm saying than a lesser argument.

I mean if we're going to use simple default values, even though we understand the intent, which is you can see a plastic bubble versus a, you know, when something's installed, for the building inspector it's easy, it's up there. I'm just saying for the applicant, for the designer, for the consultant and for the plan reviewer, until it's actually in, they don't know what it's going to be. And it just causes problems.

That's enough said. I mean we don't have to continue it here. Just -- we can talk

offline about that.

MR. FARBER: Can I just make one quick response. Actually having a single set of values which are at the low end of the range would encourage the use of the more efficient skylights, so the current system discourages it because the allowed values track with the efficiency of the skylight. Plastic skylight's got less efficient values. So it's actually the opposite effect currently.

MR. ALCORN: John Hogan.

MR. HOGAN: John Hogan, City of Seattle. I was involved when the ASHRAE 90.1 Committee tried to grapple with skylights.

(Laughter.)

MR. HOGAN: I think you're all pretty much aware that any skylight on a curve, that generally the area of the -- let's see, surface area to the rough opening is about two to one, and so you're dividing by the rough opening. So the U factor is much higher.

And so anything on a curve is going to have a different U factor than slope glazing.

MR. GABEL: SHGC tends to drive it more in California because it would be more of a

cooling problem.

MR. HOGAN: Right, so you can move in that direction; and I think the primary difference between domes and flat glass both on curve was also driven by U factor. Because the notion that if you had flat glass on a curve you could get low E, you could get argon. But with domes you can't get those coatings; you can't get that fill.

And so a lot of it was driven by U factor, so you could push something more related to SHGC. And if that's the main issue the U factor isn't much of an issue. And you set one U factor when you do the analysis, it won't make too much difference one way or another.

MR. ALCORN: Thank you, John. Mark.

MR. HYDEMAN: Mike, I just wanted to respond to your earlier issue about the definition of fan power. In this case, if you look at section 144(c), the definition --

MR. GABEL: What page is that?

MR. HYDEMAN: Page 103. The definition is actually built into the requirement. And I wasn't involved in writing this requirement, but I was involved in similar requirements in 90.1 where the rule that we had was if the definition only

occurs once inside of a requirement then we define it there as opposed to putting it external --

MR. GABEL: Right, but my understanding is the residential standards that's changing it. Isn't something in the residential standards addressing fan power and so forth?

MR. ALCORN: That's -- I don't know --

MR. ELEY: There is, but it's not consistent with this term.

MR. ALCORN: So the intention here at least is that it's completely defined within this requirement, and then there's further information in the nonres manual.

MR. GABEL: Okay.

MR. ALCORN: Jon McHugh.

MR. McHUGH: I thought I'd just respond to some of the comments about skylights. And really the issues of SHGC and U factor and visible transmittance are quite complicated. And frankly it appears that the primary effect of table 1-H is really essentially to require double-glazed skylights. And you might just be easier off just saying that you require double-glaze skylights with a thermal break in the frame and be done with it. Because essentially that's what the standard

does.

Part of the problem with regulating SHGC for skylights is that for many glazing materials outside of the glass materials visible transmittance and SHGC are somewhat related. And you could end up having the quite negative situation of inadvertently prescribing bronze skylights, which are, you know, from an energy perspective, really quite hideous because they have even lower visible transmittance than the low SHGC.

If you were gong to look at regulating SHGC I think it would make more sense to look at regulating the ration of SHGC to visible transmittance. And that would actually be a more useful metric.

We didn't address this in our skylight proposal, but it's something that I think in further standards should be looked at.

MR. ALCORN: Thank you, Jon. Mike, did you finish making all of your comments?

MR. GABEL: Yes, thank you.

MR. ALCORN: Okay, thank you. Next, John Hogan on references to outdated standards.

MR. HOGAN: I don't expect this is going

to be very controversial. But I know the CEC wants to have the best documents possible out there, so I want to make sure you cover a few different things.

I did mention these in my comments a year ago and I didn't see them having been caught yet, so I'm going to go on the record again here.

So, on page 52 in the service water heating section 113(a) there's a reference to the temperature for service hot water systems being set based on the 1995 ASHRAE applications volume. So there's a 1999 out, and we should update to that.

Further down the page, section (c), let's see, service water temperature is listed in the 1995 applications volume; so update that to '99, make sure those references are correct.

Moving on to page 102 and 103, section 144, 144(b) this is calculations for heating and cooling design loads. References a '93 fundamentals. I know Charles mentioned earlier there was some discussion about how U factor calculations might be done, and which version of the fundamentals to reference. And that might have a lot of impact on how people do things. But

for sizing heating and cooling loads it seems clear you want to reference the latest volume with 2001.

Next paragraph, indoor design conditions ASHRAE 55, 1992, and the ASHRAE handbook 1993 for general comfort conditions. And I think you want to use the latest comfort conditions for doing that.

Next page 103, occupancy densities from ASHRAE 93 fundamentals; use the latest, use the 2001 version of that.

Section 10, equipment loads. That references the '95 applications volume. You want to use the '99, the latest for that.

Another section on page 130 which is section 150(f). Talks about infiltration barriers, tested in accordance with ASTME283 1991, and that standard has been updated several times, also.

So those are just a --

MR. ELEY: What's the latest version of that one?

MR. HOGAN: It actually could be 2001, but I'm sure, check the ASTM website and you could get that information very quickly.

MR. ELEY: Because up until that point you were telling us exactly what the version was.

(Laughter.)

MR. HOGAN: Maybe somebody's got a live internet connection here; we can have it by the end of the meeting.

Well, those are the ones I caught. Now, there may be some other ones, too, but I encourage you to go through and make sure the standards are updated. Thank you.

MR. ALCORN: Thanks, John. John McHugh had comments on roof insulation and duct sealing.

MR. McHUGH: Thank you. I noticed in 118(e) much of this work was based on the PIER research that we did looking at insulation position and its effects on overall energy consumption.

And this section has placed in here an additional requirement that we actually had not proposed as part of our study, and actually didn't find any information that would validate the requirement. And that's that insulation be required to be placed below the waterproof layer.

It's not extremely a prevalent practice, but it is used, where you -- they call it the

upside down roof, where they put the insulation above the waterproof layer. And part of the reason is it's specifically placed on top of the waterproof layer because the insulation can dry out between wetting.

And I looked up some information on this and I sent around to the group an article from the -- actually from the design standards of the Army Corps of Engineers that seemed to indicate that this was not a bad practice. And, in fact, actually had substantial advantages from the life cycle cost of the roofing assembly; that it had good thermal performance; and that it had good durability in that the insulation also helps protect the roofing membrane.

If this was going to be adopted as this wording implies, I think that there should be some cost justification for eliminating this type of insulation practice.

The other section is 144(k). This was related to PG&E's proposal for duct sealing. We had a number of conversations back and forth about how to define when duct sealing should take place.

Our initial proposal was that duct sealing, that the trigger should be based on a

lineal number of feet of ducts that are in outdoors or in unconditioned spaces.

And since we have someone from the -- a building official here, I'd like to get some input in terms of the enforceability of the existing situation where the trigger is 25 percent of the duct surface area versus using a lineal feet of duct length.

It's my thought that we want to encourage energy efficiency; and to do that we need to make the requirements enforceable.

MR. TRIMBERGER: Yeah, I think 25 percent of the duct surface area is a little more, you know, complicated than you want for a cutoff value. This isn't really a numerical value that really has, you know, has consequences for the energy use. This is just a go/no-go, do you apply the standards.

So it would sure be preferable to have an easier measurement for a go/no-go value, you know. Do you have to apply the standard. So I agree with Jon.

MR. McHUGH: That's the end of my comments.

MR. ELEY: Could I get some

clarification about the insulation above the waterproof membrane? This was Gary Farber's suggestion, back in November.

I mean, if we allow this practice we have to have some restrictions, it seems. I mean you wouldn't allow them to put bat insulation up above the waterproof membrane, I assume?

MR. McHUGH: Right, that's not typical practice --

MR. ELEY: And you wouldn't allow them to use expanded polystyrene above the waterproof membrane, because that would deteriorate from ultraviolet light, become saturated with water.

No matter what the material, it seems like the hooded range, you would have a thermal bridge because between the gaps, you know, water is conductive, it could fill up. And you'd have -- so you'd have to calculate the -- the U factor would vary then, depending on whether it was raining or not raining.

It seems that if we were to allow this practice we would have to come up with some eligibility requirements or some restrictions on when it would be allowed. Are you prepared to offer such restrictions on when this would be

permitted?

MR. McHUGH: This is your proposal, so I'd expect that if you're going to have this requirement, or if you're going to have the requirement in there you'd figure out the exceptions.

I'd be certainly willing to work with Commission Staff on looking at what those requirements could be, and would be willing to provide documentation of the benefits of this type of insulation. In fact, I already have with that document I sent you from the Army Corps of Engineers.

MR. ELEY: I'm thinking that, you know, as an architect I can't imagine anyone ever doing this in new construction. But, it might be an appropriate retrofit application. But, even then, I would --

MR. McHUGH: I agree with you that it's not a very commonly used method of insulation. But unless we have some compelling proof that this is a poor practice, I don't think we start writing into standards things that, you know, essentially some hand-waving about, you know, that this might not be good.

MR. ELEY: Well, it would be poor practice if you used bats, right? It would be poor practice --

MR. McHUGH: Certainly, --

MR. ELEY: -- if you used beadboard --

MR. McHUGH: -- certainly.

MR. ELEY: It would be poor practice if you used a lot of other insulating materials. So the only time it would be good practice is when, I guess that's the really good question, --

MR. McHUGH: Right.

MR. ELEY: -- you have to define when, when it would be good practice. And even then you'd probably need to find some way to degrade the performance of it to account for water and other thermal bridges through this barrier.

MR. McHUGH: Right. And, of course, the reason that people do use this method is that this type of insulation can dry out, whereas insulation placed underneath the waterproof membrane there is use associated with either condensation or linkage degrading the insulation over the life of the roof, as well.

So there's a tradeoff of looking at this type of insulation practice versus the allowable

insulation practice of placing insulation underneath the roof membrane.

I don't think we can decide it here. What I'm suggesting is that if this was to be accepted as the code language, that there be some documentation that this, indeed, is inadvisable, or that the appropriate exemptions or adjustment factors be included as part of the requirement.

MR. ALCORN: Tony.

MR. PENNINGTON: Well, wait a minute. I think Mark wanted to --

MR. HYDEMAN: Well, if you're sticking with the roof insulation I'm happy to wait until after that. I want to go back to the --

(Parties speaking simultaneously.)

MR. PIERCE: Tony Pierce with Southern California Edison. In Palm Springs, and I don't know if 118 refers to res and nonres?

MR. ELEY: It applies to both, yeah.

MR. PIERCE: Yeah, and then there's an industry that serves the retrofit with exactly what you describe, the spray-on foam insulated roof, and they put a white coating on it to protect it from UV degradation. I think the biggest problem is ravens picking it apart for

nesting material or whatever.

But it's used; it's common. I don't know what the applications are for new construction, but it is a --

MR. ELEY: With that product I believe the membrane is actually that spray coating that they put above the foam.

MR. PIERCE: There is another --

MR. ELEY: The waterproof membrane.

MR. PIERCE: -- where there is a membrane over it that's the water barrier, vapor barrier, but there is spray-on foam with no vapor barrier.

MR. PENNINGTON: So you're saying there is no waterproof membrane in that roof system?

MR. PIERCE: Well, the membrane would be the -- built up roof system below the insulation.

MR. GABEL: And water can filter down through the --

MR. PIERCE: It is permeable, so I assume that the water filters down through and drains -- I mean we're talking about an area that gets --

MR. ELEY: Pretty dry in Palm Springs.

MR. ALCORN: Right. Elaine Hebert.

MS. HEBERT: Elaine Hebert with the Energy Commission. Along this line, if we're looking for products where we might gather some data on insulation on top of membrane, there's a photovoltaics company that makes a product that's both a layer of insulation with the photovoltaics on top. And it's meant for retrofits and it goes on top of the roof.

So they use, I think, a kind of a foam, four inches thick maybe even. And so they have lots of installations around the world and all kinds of climatic conditions. So there may be some data from that product on how well this stuff performs.

MR. PIERCE: PowerLight, and --

MS. HEBERT: Yes.

MR. PIERCE: -- there are installations all throughout California, as well. And it's a polystyrene foam.

MS. HEBERT: And is it a waterproof barrier?

MR. PIERCE: It's not waterproof.

MS. HEBERT: It sits on top of the water barrier.

MR. ALCORN: Thanks, Elaine. Okay,

Mark's going to shift gears here.

MR. HYDEMAN: I wanted to go back to the earlier issue that Jon brought up, actually the second issue that Jon brought up about duct surface area versus lineal feet. It's a little more complicated in terms of the intention.

The intention of this requirement is to be able to distinguish between that portion of duct work that's in conditioned space, or indirectly conditioned space, and that portion that's in unconditioned and on the roof.

The data from Mark Modera indicates that most of the leakage actually occurs at the connections generally in the roof's ceiling space of the duct work to the plenum and also again in the connection to the diffusers and registers.

Given that limitation it's very hard for us to come up quickly with a lineal foot that says for all duct systems the majority of it, in fact, is outside of the building envelope, either indirectly or directly conditioned space.

The thought was that there could be a simple calculation spreadsheet, be another work sheet, sorry, that would say I've got 18 feet of six-inch round; here's the surface perimeter of

that; here's the surface area. And really the building official would look at that worksheet.

So that was the intention. I think if you have some suggestions, Tom, as to how to make that an easier requirement we would be open to it. But I don't want to lose the fact that really we're trying to distinguish between ducts and unconditioned spaces and that portion that are in conditioned spaces.

MR. AHMED: I have a suggestion; why not based on cfm?

MR. HYDEMAN: Again, it just has to do with the location of where the leaks are, and they're -- perhaps I misunderstood you?

MR. AHMED: What is it not --

MR. HYDEMAN: How would you apply cfm?

MR. AHMED: -- instead of areas or linear feet, why is it not based on percentage of cfm that's in, you know, --

MR. HYDEMAN: I don't know how you'd apply that, because at the unit, you think most units 100 percent of the cfm goes out that first two feet which may just be an elbow going --

MR. AHMED: No, no, no, I meant a percentage of the cfm that goes to those ducts.

MR. HYDEMAN: That's what I'm saying --

MR. AHMED: You're worried about section of the duct that's in the unconditioned space, right?

MR. HYDEMAN: Well, with duct leakage what we're concerned about is where the leaks occur. And it would be hard to base a standard on where those leaks occur, because, you know, from Tom's viewpoint he doesn't want to have to crawl up in the attic space and look at smoke coming out of holes.

Since we don't know exactly where the duct leaks occur, they could be anyplace, they could be at the connection to the unit, in the ceiling space where the downward part of the drop hits the plenum, at the plenum, itself, as it connects to the branches, where the branches connect to the diffusers.

The thought was we wanted to make sure that the majority of the duct work was -- or at least a big section of it was in unconditioned space. And so we use this area as a proxy for that.

But, again, we don't need to do this here. We don't need to write code in the middle

of a meeting. But I'd suggest that, you know, Tom, if you can think of a way of making it simpler than area, we're certainly open to that.

But the concern is to make sure that we're not putting requirements on systems where most of those leaks are, in fact, happening in conditioned space.

MR. TRIMBERGER: Yeah, you know, just what comes to mind, and I haven't thought this all through, I'll throw it out anyway. Is if you take 10 percent of your lineal length of the duct, but I guess that's hard to do, also. You know you could have, you know, a package unit on the roof with side discharge and an elbow down, and it goes through a, you know, a five-foot, eight-foot attic, and to a concentric diffuser, one diffuser, and still have most of the duct work be outside of the conditioned area. Would that be appropriate to test, I'm not sure.

MR. HYDEMAN: And the other example, Tom, that we came up with, I've been working on schools and auditoriums where you have to run, pull the unit back because of sound reasons, acoustical reasons. And you may have 20 feet along the roof. Then you drop down, you have 100

feet in the space.

So, we have both ends.

MR. STONE: Mark, it sounds -- maybe I just didn't hear you correctly -- it sounds like what you're saying is that it's easier to have a worksheet where you figure out the area by length of the duct times the diameter, rather than just figuring out percentage by length of the duct, which is what Jon was recommending. Just go with length of the duct. And what you're saying is length of the duct times diameter, so you get the surface area. And I'm not sure why your proposal is easier.

MR. HYDEMAN: Well, what Jon originally proposed was lineal feet on the roof, because that's what, you know, when Tom's out there he can walk on the roof with a tape measure. But the problem is that the space underneath the roof is probably where most of the leaks are occurring.

And so the idea is how do you capture that. Well, Tom's not going to be crawling, you know, standing on these little t-bars measuring length of ducts. So we're down to taking stuff off plans. It's got to go onto a worksheet anyway, and it seems to me area is probably just

as good as lineal feet, once you've gone to the worksheet.

But, again, we're open to suggestions.

MR. TRIMBERGER: I'd hate to see a worksheet just to show do you apply the section of the code, but that seems like more work than it's worth. I'll think about it.

MR. HYDEMAN: Thank you.

MR. ALCORN: Okay, Jon McHugh, did we address all of your comments?

MR. McHUGH: Yeah.

MR. ALCORN: Okay, thank you. Tom, I've got a card here and I think you want to have some miscellaneous issues that you want to go through? We may have touched on them already.

MR. TRIMBERGER: We may have. Looking at some of the measures, the demand control ventilation and R8 minimum duct insulation are mandatory measures.

My understanding, I'm not sure I got this all right, is the nonres exceptance requirements for nonresidential buildings, these are all compliance prescriptive measures, but would not necessarily apply if there's a performance approach.

MR. PENNINGTON: The exceptance requirements are mandatory.

MR. TRIMBERGER: The exceptance requirements are there if you're taking credit for those --

MR. PENNINGTON: I'm sorry, I gave too simplistic of an answer to your question. There are requirements for exceptance requirements within the body of the standards. And most of those are mandatory. I guess there's actually one or two prescriptive. The economizer is prescriptive and I guess the duct sealing is prescriptive.

MR. HYDEMAN: Yes.

MR. PENNINGTON: But the others are mandatory. And then in the ACM manual, which we're not even talking about -- well, I guess the exceptance requirements chapter are, you know, how to go about doing these tests.

MR. TRIMBERGER: Okay.

MR. PENNINGTON: And those are going to be a chapter attached to the ACM manual.

MR. TRIMBERGER: Is that this handout you have here?

MR. PENNINGTON: Right.

MR. PENNINGTON: So those are actually just more detail on what the standard says.

MR. TRIMBERGER: If someone has a central air handler they will be required to do the exceptions requirements in here for every one?

MR. ELEY: If they take credit for it --

MR. TRIMBERGER: I they take credit for it.

MR. ELEY: Right.

MR. PENNINGTON: Well, --

MR. HYDEMAN: I think actually what Bill said at first is probably correct, and that is even if you put something in that's a prescriptive feature like an air side economizer, that air side economizer doesn't comply with the prescriptive requirement until it meets the exceptance requirements.

In other words, in order to be an air side economizer, in accordance to section 144, it also has to meet the exceptance requirements, which are quite easy in this case because it can be factory-certified -- factory installed and certified in performance.

But in that sense the exceptance requirements really are a mandatory measure. In

other words, you can't get around it if you're going to use that item. But they apply as well to prescriptive items like air side economizers and duct sealing.

MR. TRIMBERGER: Air distribution systems where just the duct work is a criteria here, that's talking about the 6 percent. That would be a prescriptive measure that you wouldn't necessarily have to do on every system?

MR. HYDEMAN: Correct. But if you decided to do it you would also have to do the test that went along with that which is part of the exceptance requirements.

MR. TRIMBERGER: Okay, so every economizer that gets installed, does it have to go through the exceptance procedures?

MR. HYDEMAN: Correct. That was the intention as it's written.

MR. TRIMBERGER: Every package HVAC system that's installed has to go through the exceptance requirements?

MR. HYDEMAN: You will note that the exceptance requirements for package HVAC and the exceptance requirements for central HVAC really are testing the controls, so it goes back to the

control sections of HVAC and the ventilation, which goes back to section 121.

So those become really exceptance requirements in the section 121 requirements, and the controls, which I can't remember the section number on. But wherever the thermostats and time clocks are.

MR. PENNINGTON: What you need to do is you need to look at the standards and this exceptance requirements document at the same time.

MR. TRIMBERGER: It's all different places. Sometimes it --

MR. PENNINGTON: Well, the standard is intended to have a shortened version of, okay, here's what you have to do. And then this is how you do it. So these are details on how you do it.

So, it depends on what section the exceptance requirements is in the standard whether that requirement is mandatory or prescriptive or whatever.

MR. TRIMBERGER: And would that be documented then through a form then that's filled out by the installing contractor or signed by the contractor or the engineer of record?

MR. HYDEMAN: Yeah.

MR. TRIMBERGER: That and I guess we can talk about a couple other little things that I had concerns over. Still kind of digesting some of the scope and complexity of some of these things.

A lot of, you know, the terms we started talking about, you know, the controls issues, demand control ventilation, ECM motors, VAV size, variable speed drives, these are complex terms for building inspectors in the field, or a plan checker. And it's going to take some training and education to get to a speed to be able to handle that.

Other than that I don't have any additional comments.

MR. ALCORN: Okay, thanks, Tom. I think we have a final set of comments coming from Gary Farber.

MR. FARBER: Okay, thank you. Let's see. First a few things, I'll just respond to a couple of items we've talked about. As far as the wet insulation system, that was a real project designed by the largest international architecture firms for a large airport terminal. And that's why I brought it up.

I haven't seen it before, but I would

agree with Charles that unless we come up with some type of, you know, methodology to account for the rainwater, you know, taking the heat away, and with some rain factor for different climate zones or something, you know, up until that time we just shouldn't allow it. There's too many variables that we're not familiar with.

Back to the skylight issue. I just wanted to be really clear. The problem with the skylight and having three different allowed sets of efficiency factors is that the energy consultant often doesn't know at the time we're doing the calculation what type of skylight they want to use. And therefore we can't select any of them.

And the other issue is if we do a calculation assuming it's a plastic skylight and they decide to put in a more efficient one, they can't. So those are the basic issues there. Without redoing the calculations.

There's really no precedent for having the allowance float around depending on what the product type is. That doesn't happen with, you know, vertical fenestration or other types of things. So we just want to keep it simple.

MR. PENNINGTON: So, were you specifying vertical fenestration?

MR. FARBER: Yes.

MR. PENNINGTON: You put in an SHGC in your calculations of .5?

MR. FARBER: Right.

MR. PENNINGTON: If you install a .4 in the building, the calculations have to be redone?

MR. FARBER: No.

MR. PENNINGTON: So I don't understand --

MR. FARBER: The problem with the skylights is that the allowed factors vary depending on the type of skylight you use. That does not happen with vertical. No matter what type of vertical you use, the allowed vertical fenestration efficiencies that you're being compared to are static.

Other than the fact that the solar heat gain, of course, varies with the area. But it doesn't vary with the technology. Here we've got it varying with the technology.

MR. PENNINGTON: So for the performance standards you're going to enter an SHGC and a U factor that you're shooting for?

MR. FARBER: Right, but it does --

MR. PENNINGTON: And it has to be at least as good as what's --

MR. FARBER: -- but right now it requires us to say whether it's glass on curve, glass not on curve, or plastic.

MR. PENNINGTON: That's the input into the program right now.

MR. FARBER: Yes, right. It has to be because right now it's being compared to values that depending on whether it's one of those three choices. That just really creates a big problem. We'd just like to see one set of factors. And if you put in more, you know, if you put in a less efficient one you get dinged on, you know.

And that doesn't mean you're stuck in performance, because obviously a prescriptive, there are tradeoffs in the envelope, too, as long as you're on the overall envelope approach.

Okay. Manufactured fenestration product. The definitions, this is on page 29. Mike brought this up briefly, Mike Gabel brought it up briefly. But I wanted to talk about this a little bit more because it's so important now, the distinction between factory assembled and site

assembled.

And the first thing I'd like to point out is it would really be nice if we had, you know, terms that were a little bit more descriptive of what we're actually looking for. Because manufactured, I mean obviously -- wall systems and storefront systems are manufactured. But that's not the meaning of manufactured, as we're using it in this code right now.

The current meaning of manufactured fenestration product is factory assembled. And I'd like to propose that we just use that terminology, factory assembled, as opposed to manufactured, so that we're just being really clear about it.

The second thing is if we look at the definition of manufactured fenestration product, the current one and the one in the proposed language does not change. It says it includes knocked-down and partially assembled.

Well, how does that fit into this big demarcation we have between factory assembled, which as of October 1st, cannot use the ACF, or solar heat gain coefficient anymore; it can only use the default table or NFRC. And site assembled

can continue using that.

So, both the term and the definition needs to, you know, be clarified.

You've done a lot of things to extend the standards beyond where they used to be, you know. Lighting, as I pointed out before, there's a big push on extending that to new areas.

And one of the suggestions I had made, I don't think this got picked up. It would be really simple. Is to extend building envelope compliance to include envelopes outside the human comfort range. That hasn't been picked up yet in this go-round, has it?

MR. PENNINGTON: So you're thinking about agricultural buildings and stuff like that? I'm just having a little fun with Tom here.

MR. FARBER: Industrial buildings.

MR. SPEAKER: Just uncomfortable ones.

MR. FARBER: Right, right. There's like warehouses that are kept cold and, you know, they're exempt below 55 degrees. I'm just not sure that there's any reason to exempt envelopes if they're conditioned in any way. So some sort of considered --

MR. SPEAKER: We have --

MR. FARBER: You know, I mean obviously the ones that are kept coldest and hottest have the biggest energy issues, so why exempt the envelope?

MR. ALCORN: Was there a comment? Did you have a comment, Tom, or some --

MR. TRIMBERGER: I'd better not.

MR. PENNINGTON: Okay.

(Laughter.)

MR. FARBER: Mike also brought up the water heating. A real simple approach to deal with the nonresidential water heating is just say if it's got a gas-fired system, fine. Any certified system is acceptable. Now we say any certified system, regardless of energy type, is acceptable. We could just simply leave it for, you know, say gas-fired ones are acceptable regardless of the configuration.

If it's electric, then you have to go performance and be compared to a gas system. And I think that would be a relatively simple thing to enact.

The last thing I was going to bring up, and this is -- I have been speaking on behalf of CABEC. This last one we haven't actually

discussed, so this is just my own thing, -- but, as this point -- but there are -- this has to do with the performance compliance and what the referenced mechanical system is.

And currently for a low rise nonresidential the reference system is either single zone or a multi-zone, depending on what the proposed system is. And I think we ought to seriously consider saying that buildings beyond a certain conditioned floor area, that the reference system is going to be a multi-zone system.

Because obviously there are some very large buildings that are two and three stories, and you know, to be compared to single zone systems, just because they're proposing single zone systems, you know, it's just not a very efficient way to go.

And I think that might be a way to tighten up the standards a little bit. I have no idea, you know, whether it's going to apply to that large number of buildings, although it doesn't take that large a number in terms of square foot impact, you know, if it does impact a few very large ones.

MR. AHMED: This could cause a problem

when there's variability of use. Sometimes the design requires single zone systems be put in because of variability of use and occupancy. So, you know, it's a good suggestion, but there are exceptions.

MR. FARBER: -- examples for that --

MR. AHMED: Well, multiple tenants, for example.

MR. FARBER: That's going to be unusual in a very large building. I'm not sure where we set the limit.

MR. AHMED: Oh, I understand. I've done --

MR. FARBER: I'm talking about --

MR. AHMED: -- I've done audits for 50,000 square foot area where there are 52 package units.

MR. FARBER: Right, right.

MR. AHMED: Because of different tenants have different hours; they want to have control over their system.

MR. FARBER: Yeah, and I'm thinking maybe we're talking about 150 or 200 thousand, something like that. There's some breakpoint beyond which, you know, the reference system ought

to be more efficient than single zone. Anyway, just wanted to throw that out.

Thanks.

MR. ALCORN: Okay.

MR. PENNINGTON: Do you have a reaction to that, Mark, at all?

MR. HYDEMAN: Unfortunately, missed the question, so --

MR. PENNINGTON: Okay.

(Laughter.)

MR. HYDEMAN: I thought we were on the --

MR. MAHONE: I can give you a reaction to it.

MR. SPEAKER: I have a reaction to it.

MR. ALCORN: Okay. Doug, why don't you go on ahead.

MR. MAHONE: Yeah, Gary, I was there when that rule was sort of set up back in the early '80s. We spent a lot of time talking about just that issue that you're raising.

And because of the kinds of problems that Ahmed is citing and because of the fact that the choice of the mechanical system type is governed by a whole lot bigger issues than energy,

the decision was made to let the designer or the owner decide what type of system they were going to put in. And then the standard would say, okay, if that's the type of system here's the minimum efficiency, and that's what the baseline would be set at.

And rather than trying to get into kind of cross-system comparisons. And that was the thinking that was done. ASHRAE has adopted a similar philosophy in the ECB method. It basically came down to feeling that it was going to be really problematic to try to second guess the type of system selection in the energy code.

MR. FARBER: And yet if it's four stories or more, then the reference system is multi-zone regardless of what the design system is. So you have a 50,000 square foot, four story building, and it's multi-zoned. You have a 200,000 square foot, three story building and they can go ahead and do single zone.

MR. HYDEMAN: Gary, if I could. This is one of those issues very much like fan power that I was talking with Martyn about before, where we'd really love to, kind of the -- what are they really called, the golden chalice, or whatever,

would be to, you know, be able to find a system comparison where you could say, oh, you're doing this system; here's, you know, using some -- sort of system. Here's the right way to do it.

The problem is with HVAC systems there are not five or ten, there's thousands of variations. I mean you can have a system that's basically VAV reheat, but allowed a couple of fan powered boxes. You may have a separate perimeter system associated with it.

And as Doug was saying, you know, really struggled with this in 90.1, and also in Title 24, to come up with a mapping that was reasonable, but took into account the fact that we really can't, you know, accurately set a baseline for each and every individual system.

And I personally spent hundreds of hours on this issue with other committee members trying to figure our way through this one. And I think unless you come up with a program that kind of can dynamically look at what you're doing and say I'm changing the baseline based on some set of expert rules, I don't know how you do a good job with this.

And our codes right now are at a point

where we still need them on paper and people aren't ready to move to kind of a dynamically generated code that's computer-based.

So I think until we all, until whole buildings become performance method, and we get rid of the prescriptive and mandatory, I don't think we'll be in a position to do that.

And I don't know of a piece of code right now that does a good job of it. Now Charles has written code to come up with some simple defaults for different system types; so has Jeff Hirsch and gang with Equest and others that have come up with HVAC systems.

But you could poke holes in the schedules; you could poke holes in the, you know, even the defaults, how many static -- static pressure and so on and so forth that you have. And there's no right answer in the end.

MR. FARBER: Well, just to clarify, I'm not talking about really regulating what the proposed system is. All I'm saying is that, you know, with a building beyond a certain volume, the reference system would be package VAV, as it is for high rise nonres.

And that's not going to mean necessarily

you can't put in your single zone system, it just means it's going to be a little bit tougher. I mean obviously the package VAV is not the most efficient system. It's not a built-up, you know. It's just moderately efficient, moderately more efficient than a single zone.

But it would just make it somewhat tougher and it would only apply to buildings of, you know, a certain class of very large buildings.

MR. ALCORN: Bruce.

MR. MAEDA: Now, going back to actually when that was first derived, actually -- the indications were that actually gas/electric packages serving single zones was actually the most efficient system you could possibly put in a building if they all serve the zones, and they all had economizers.

But it's also not always possible, given the design of the building, to do that. And so that's part of the reason.

The other part of the reason is if you, once you have a multi-zone system they have to define an awful lot of things about it; when you're proposing a package system, and then you say your reference system is a multi-zone system,

suddenly you don't know how to define a lot of those default systems that you're going to model for your budget building. And that's part of it.

That's also why package VAV is used as the base, because that way it service much smaller units, and you don't have some of the design issues that you'd have to make decisions about in the budget, to develop the reference budget are less important. That's sort of how that came about.

MR. FARBER: Findings for single zone, multiple single zones is more efficient than multi-zone? Is that --

MR. MAEDA: Well, --

MR. FARBER: -- or at least --

MR. MAEDA: -- in the runs that we did in '80, '85 that was for the office standards. That appeared to be the case.

MR. FARBER: Was that assuming variable frequency drive? Or is that maybe predate that somewhat?

MR. MAEDA: They didn't need variable frequency drive; they didn't -- they essentially didn't heat or cool when there was no heating or cooling to demand. This was on demand for each

zone. Every zone was served by a single system.

MR. FARBER: Right.

MR. MAEDA: So you didn't have to have variation, the system --

MR. FARBER: No, I was talking about --

MR. MAEDA: -- the heating and cooling would go off the ventilation --

MR. FARBER: -- the comparisons, the multi-zone system, was that assuming with variable frequency drive for --

MR. MAEDA: Probably. That would -- no, probably not, actually --

MR. FARBER: Probably not. So, --

MR. MAEDA: Yeah, at that time --

MR. FARBER: Right.

MR. MAEDA: Even though it's been cost effective since '85, we decided to --

MR. HYDEMAN: By multi-zone system you really mean a multiple zone system, because multi-zone is very specifically a system that is generally constant volume, although there are variations of that, as well.

Again, there's no right answer. The two mapping exercises that I know, the one in California and the one in 90.1, which I suggest

you look at, are really a consensus of experts.

There is data out there in both the CEUS database, which the California Energy Commission has access to the new construction database, and also in CBEC's, of what types of systems are really out there in real buildings.

And one could, you know, presumably do some sort of survey of that. But it would be a huge effort, and again I'm not sure -- I will guarantee you we may fix some problems, but we will cause others in the process.

And I think it would be easier to deal with the specific proposal for a change. I know that there are problems in the existing mapping of both 90.1 and Title 24, but it would be much easier to deal with the specific proposal on a specific mapping change than to try and say, let's just redo the whole thing, or readdress it.

I'm just not sure where you start. Kind of like eating an elephant.

MR. ALCORN: Okay, Gary, does that conclude your comments?

MR. FARBER: Yes.

MR. ALCORN: Okay. Thank you. Are there any additional miscellaneous comments before

we wrap up for the day?

Okay, I'd like to thank you all for your participation in this workshop today. And remind everyone that the next draft of the standards and the ACMs will be presented at a workshop in mid January of 2003. Watch the website for the actual days and the notice.

Thank you, again.

(Whereupon, at 4:07 p.m., the workshop was adjourned.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 9th day of December, 2002.